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This annotated bibliography, intended for elementary and secondary school teachers, their pupils, and general adult readers contains grade level coded lists of books, reference works, periodicals, and teaching aids dealing with astronomy and space flight subjects. The reading material is listed alphabetically by author. The teaching aids in Part IV are categorized under subject headings and subheadings. Headings include manned space flight, unmanned spacecraft, rockets, model rocketry, astronomy, and careers. Addresses of publishers and suppliers are included. (BC)

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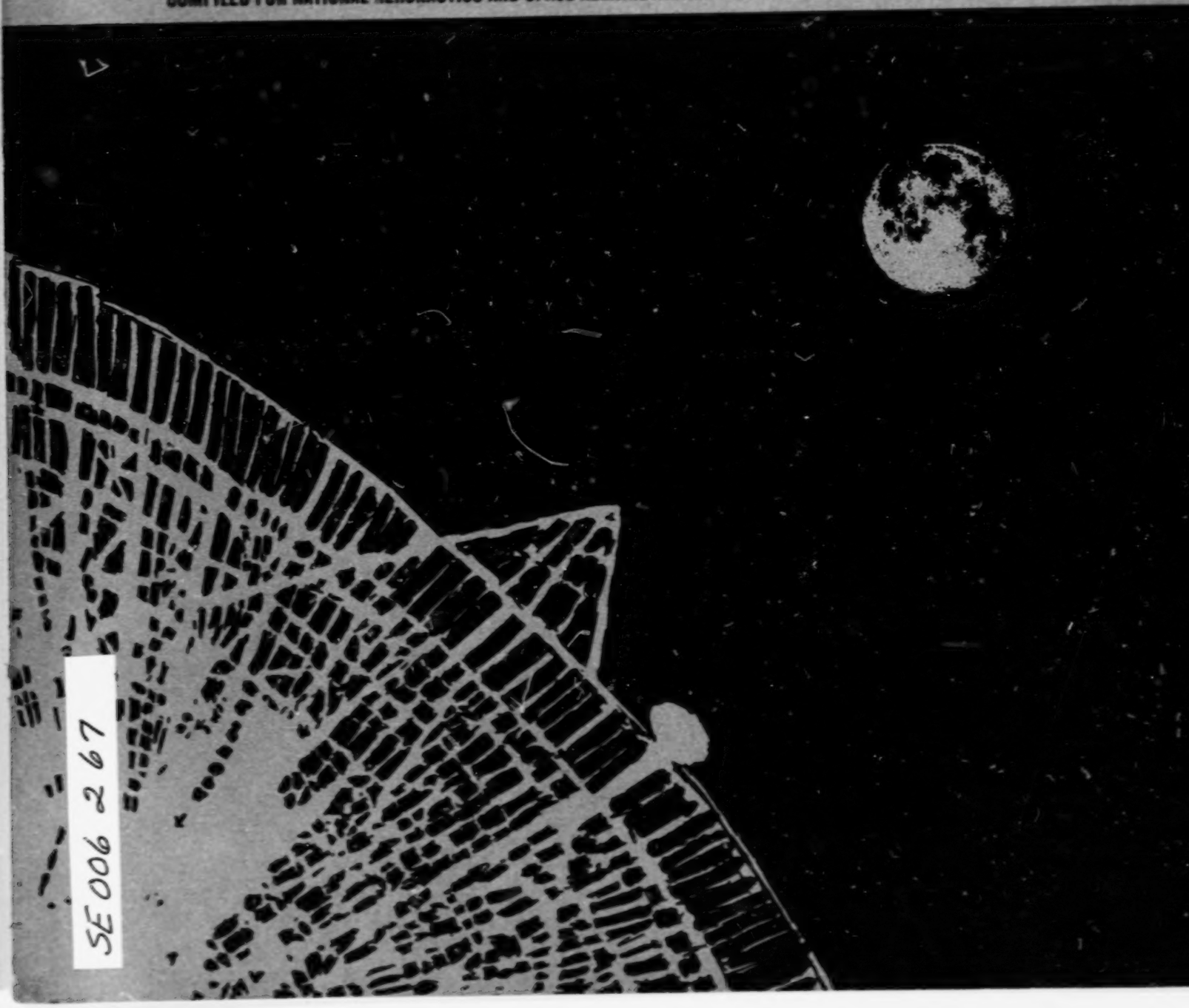

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Code for reading or usage levels

P—Primary grades, 1-3
I—Intermediate grades, 4-6
U—Upper grades, 7-8
S—Secondary grades, 9-12
A—College and adult levels

preface

With the publication of the Fourth Edition of the AEROSPACE BIBLIOGRAPHY, the National Aeronautics and Space Administration presents to elementary and secondary school teachers, their pupils and to the general adult reader an updated, annotated and graded list of books, reference works, periodicals, and teaching aids dealing with space flight subjects.

Some semi-technical items have been included for those readers who wish to deepen their knowledge of the emerging fields of aerospace research and technology.

In such cases the semi-technical nature of the material is indicated in the annotation.

Books listed in Part 1 bear copyright dates 1965 through 1967.

A few "out of print" books have been included as they may be available to readers in libraries.

Aeronautical titles are limited to those dealing with research.

For a broader treatment of aeronautics, the reader is referred to AVIATION EDUCATION BIBLIOGRAPHY published by the National Aerospace Education Council. (See, p. 26.)

Astronomy titles were selected on the basis of their relation to space exploration.

The reading, or usage level of each book and teaching aid is designated by code letters as follows: (P) primary, grades 1-3: (I) intermediate, grades 4-6; (U) upper, grades 7-8; (S) secondary, grades 9-12; and (A) college and adult levels.

For the first time, the teaching aids listed in Part IV are arranged under subject headings and subheadings with the hope that this arrangement will be more useful to the teacher.

Also for the first time, the bibliography omits listings of film and filmstrips; this information is readily available in film lists from many sources. (See, p. 47.)

Information and materials on model rocketry include only those sources that subscribe to the safety code of the National Association of Rocketry.

As a further source of information the user of this bibliography is urged to consult library volumes of *The Reader's Guide to Periodical Literature,* where articles on space flight subjects may be located in current periodicals under such subject headings as: astronautics, rockets, space vehicles, manned space flight, lunar probes, the moon, orbits, etc.

Requests for free materials and orders for books and sale items should be sent directly to the publisher or supplier as indicated.

Addresses of publishers and suppliers appear on pages 57-63.

The books and teaching aids appearing in this bibliography comprise only a partial listing and therefore this bibliography should not be considered as complete or exhaustive.

The listing of any item should not be viewed as an endorsement by either the National Aeronautics and Space Administration or by the National Aerospace Education Council, compiler.

The National Aerospace Education Council acknowledges with thanks the assistance of representatives of the many publishers, organizations, government agencies, and private firms whose cooperation in compiling this bibliography was solicited and most courteously extended.

part-I

SKYLOOKS

PART I - BOOKS
General Overview of Space Exploration

Books in this section give the reader a general, overall view of the many phases and facets of space exploration without concentrating on any one subject. For books with more detailed and specialized information about particular areas of the space program, consult the table of contents of this bibliography.

BAAR, JAMES and WILLIAM E. HOWARD. SPACECRAFT AND MISSILES OF THE WORLD, 1966. Harcourt, 112 p., illus., 1966. $6.50. Descriptions of U.S. and foreign spacecraft and missiles with pertinent statistics and brief articles on past, present, and future developments. (S)

BERNARDO, JAMES V. AVIATION AND SPACE IN THE MODERN WORLD. Dutton, 400 p., illus., revised 1968. $5.95. A comprehensive survey of flight in the atmosphere and flight in space, and their social, economic, and political impacts. This new edition is updated and sections concerning space flight have been expanded. (S-A)

CROSBY, ALEXANDER L. THE WORLD OF ROCKETS. Random, 96 p., illus., 1965. $1.95. How rockets work. The problems and dangers of manned space flight. What we hope to learn by exploring the moon and the planets. (I)

ELTING, MARY. SPACECRAFT AT WORK. Harvey, 96 p., illus., 1965. $2.95. A brief report for young readers on the space program, including unmanned spacecraft, Project Apollo, astronaut training, and launch vehicles. (I)

HAGGERTY, JAMES J., editor. UNITED STATES AIRCRAFT, MISSILES AND SPACECRAFT. National Aerospace Education Council, approx. 200 p., illus., issued annually. Paperback, $2. A pictorial review of all U.S. aircraft, missiles and spacecraft currently in production. Includes photographs, specifications, performance data and comments; aerospace records and awards, and significant aerospace events for the year. (U-S-A)

_____. MAN'S CONQUEST OF SPACE. Scholastic, 127 p., illus., 1966. Paperback, 50 cents. An overall examination of the U.S. space program. Considers reasons for exploring space, manned and unmanned space exploration, launch vehicles, satellites and space probes, Projects Gemini and Apollo, and long range space plans. This book is one of the series of Vistas of Science developed under a joint project of the National Science Teachers Association and NASA. Includes suggested student activities. (U-S)

KEEN, MARTIN. THE WONDERS OF SPACE: ROCKETS, MISSILES AND SPACECRAFT. Grosset, 160 p., illus., 1967. $3.95. Information about today's advances in rocketry and spacecraft, and a history of the exploration of space including the complete series of Gemini flights. (I-U)

MATTHEWS, JIM, editor. SPACE HORIZONS. Prestige, 97 p., illus., 1965. Paperback, $1.25. A profusely illustrated, magazine-type survey of our nation's space program written in popular style. (U-S-A)

MOORE, PATRICK. THE SKY AT NIGHT. Norton, 224 p., illus., first American edition, 1965. $5.95. A collection of brief articles based on "The Sky at Night" British Broadcasting Company TV programs, from which the title of this book originates. Discusses numerous space topics such as lunar bases, the back of the moon, extraterrestrial life, planetary contamination, and the use of Martian satellites as space stations. (U-S)

NEWLON, CLARKE. 1001 ANSWERS TO QUESTIONS ABOUT SPACE. Grosset, 362 p., illus., revised 1966. Paperback, $2.95. Many aspects of space travel and the technology behind it are explained in question and answer form. Information is organized under 18 major headings. Indexed. (U-S-A)

PACILIO, JAMES V. DISCOVERING AEROSPACE. Children's Press, 157 p., illus., 1965. $4.50. A book of simple explanations and experiments to demonstrate the principles of flight in the atmosphere and in space. While most of the book is devoted to flight in the atmosphere, the last third presents discussion and experiments related to rocket propulsion, gravity, orbits, satellite movement, space environment, and re-entry techniques. (I-U)

SONNEBORN, RUTH A. THE QUESTION AND ANSWER BOOK OF SPACE. Random, 64 p., illus., 1965. $1.95. Answers questions about space, rockets, satellites, space ships, astronauts, space stations and a trip to the moon. (P)

SPACE WORLD YEARBOOK. Palmer, 110 p., illus., 1965. $5. Chronology of all space launchings, 1958-1964, including mission, launch vehicle, apogee, perigee, decay date, etc., and other facts and figures on the space program. Many color photographs and black and white pictures plus specifications of major satellites and launch vehicles. (U-S-A)

VON BRAUN, WERNHER. SPACE FRONTIER. Holt, 216 p., illus., 1967. $4.95. The Director of NASA's Marshall Space Flight Center explains the complex nature of flight in space, and discusses such topics as launch and ascent, flight through space, safety in space, space stations, flights to the moon, and possibilities of flight to planets and stars. (S-A)

Space Science and Technology

Books in this section deal in detail with the science and technology of space flight. Topics discussed include telemetry, satellite and space probe tracking, fuel cells, solar cells, the roles of the various scientific disciplines in space exploration, the magnetosphere, astrophysics, and space flight mathematics. Additional information on these subjects may be found in books listed in this bibliography under such sub headings as "Astronomy", "Rocketry", "Extraterrestrial Life", "Manned Space Flight", "Unmanned Satellites and Space Probes". Less detailed discussions of these subjects may be found in some of the books listed on pages 7 and 8 of this bibliography. Also see appropriate headings in Table of Contents Part IV, Teaching Aids

AHRENDT, MYRL H. THE MATHEMATICS OF SPACE EXPLORATION. Holt, 160 p., illus., 1965. Paperback, $1.96. Some of the mathematics involved in space exploration and the laws of celestial mechanics. Space-related materials of instruction for mathematics teachers and students with problems for students to solve. One of 14 volumes of the SPACE SCIENCE SERIES. (S)

ANDREWS, ALAN. ABC'S OF TELEMETRY. Sams, 95 p., illus., 1965. Paperback, $1.95. Explains telemetry to the beginner in the field or to the person wanting an overall view of what the subject involves. Stresses terminology. No previous knowledge of telemetry is assumed but a basic knowledge of electricity is helpful to the reader. (S-A)

ASIMOV, ISAAC. THE DOUBLE PLANET. Abelard, 159 p., illus., revised 1966. $4. How man has probed the secrets of the earth and moon. Discusses such subjects as the magnetosphere, its shape, and its reaction to solar wind; communications satellites; photographs of the moon; volcanic activity on the moon; and lunar landings by man. (U-S)

BRANLEY, FRANKLYN M. EXPERIMENTS IN THE PRINCIPLES OF SPACE TRAVEL. Crowell, 119 p., illus., updated 1966. $3.50. Explanations of the scientific principles involved in space travel with experiments that can be performed with simple equipment to demonstrate their action. Updated to include references to recent findings. (U)

BUTLER, S. T. and H. MESSEL, editors. ATOMS TO ANDROMEDA. Pergamon, 301 p., illus., 1966. Paperback, $3.50. Selected lecutres for summer science high school students given under the auspices of the University of Sydney. Topics include theoretical physics, high energy nuclear and cosmic ray research, plasma, and thermonuclear physics, astronomy, astrophysics and electronic computing. (S-A)

ENGLE, ELOISE and KENNETH H. DRUMMOND. SKY RANGERS: SATELLITE TRACKING AROUND THE WORLD. Day, 256 p., illus., 1965. $4.95. How we keep track of space hardware in the sky, including a history of satellite tracking and descriptions of the Mini-

track network, optical tracking, the military tracking system, and the network covering manned space flight. (S-A)

GARDNER, MARJORIE H. CHEMISTRY IN THE SPACE AGE. Holt, 168 p., illus., 1965. Paperback, $1.96. The chemistry of the solar system and beyond, with an introduction to the possibilities of life on other planets. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

GLASSTONE, SAMUEL. SOURCEBOOK ON THE SPACE SCIENCES. Van Nostrand, 960 p., illus., 1965. $7.95. Stresses significant advances in existing sciences that can be contributed by space flight. Covers present state of the space exploration program and its impacts on the future growth of knowledge for all scientific and engineering areas. Written in cooperation with the National Aeronautics and Space Administration. Semi-technical. (A)

HABER, HEINZ. SPACE SCIENCE: A New Look at the Universe. Golden, 154 p., illus., 1967. $3.95. A reappraisal of the knowledge of our universe in the light of new information resulting from space research. Summarizes findings derived from Ranger, Explorer and Mariner spacecraft, and earth satellites. Discusses space projects of the future. (S-A)

HALACY, D. S., JR. FUEL CELLS: POWER FOR TOMORROW. World, 190 p., illus., 1966. $4.50. Describes how fuel cells work as they convert chemical elements directly into electrical current. Also discusses the history of fuel cells, their application to space flight and how to build and operate a fuel cell. (U-S)

HARBECK, RICHARD M. and LLOYD K. JOHNSON. EARTH AND SPACE SCIENCE. Holt, 296 p., illus., 1965. Paperback, $2.48. The last half of this book discusses space science and considers the moon, planets, stars, theories of the universe and extraterrestrial life, and the mechanics of escaping from earth. (S-A)

HOBERMAN, STU. SOLAR CELL AND PHOTOCELL EXPERIMENTERS GUIDE. Sams, 128 p., illus., 1965. $2.95. The theory, application and construction of light-sensitive solar and photoelectric cells. Easy-to-build and low-cost projects are described, such as a sun-powered radio and a basic photoelectric (solar) relay. (S)

HYMOFF, EDWARD. GUIDANCE AND CONTROL OF SPACECRAFT. Holt, 170 p., illus., 1966. Paperback, $1.96. Explanations of the systems used to guide and control spacecraft on various types of missions, both manned and unmanned. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

KLEIN, H. ARTHUR. FUEL CELLS. An Introduction to Electro-Chemistry. Lippincott, 148 p., illus., 1966. $4.25. An introduction to the history, operation and understanding of fuel cells, and predictions for their future use. (U-S-A)

KONDO, HERBERT. ADVENTURES IN SPACE AND TIME. Holiday, 93 p., illus., 1966. $2.95. Einstein's theory of relativity is explained in language and in a style that is readily understandable to children. Older readers will find the explanations and analogies helpful, too. A brief biography of Prof. Einstein is included. (U-S-A)

LUNDQUIST, CHARLES A. SPACE SCIENCE. McGraw-Hill, 116 p., illus., 1966. $4.95. Also available in paperback edition. $2.50. An introduction to space science. Discusses spacecraft and their orbits, the earth and its many fields (magnetic, radiation, ionosphere, etc.), the moon, interplanetary space, and applied and manned space science. Useful as a beginning astronomy text for undergraduates, or for the general reader with a science background. Discussions involving mathematics can be ignored without loss of continuity. Also includes semi-technical references for further reading. (A)

MEITNER, JOHN F., editor. ASTRONAUTICS FOR SCIENCE TEACHERS. Wiley, approx. 344 p., 1965. $8.50. Ten authors discuss their special fields (physics, biology, mathematics, etc.) as they relate to astronautics, or the general area of space travel. A concluding chapter suggests methods and aids for introducing astronautics in the science classroom. College level. (A)

POSIN, DANIEL Q. SCIENCE IN THE AGE OF SPACE. Quadrangle, 271 p., illus., 1965. $4.95. Shows how all the scientific disciplines—physics, biology, chemistry, astronomy, etc.—have joined forces to tackle the problems of space exploration. (S-A)

SANGER, EUGEN. SPACE FLIGHT: COUNTDOWN FOR THE FUTURE. McGraw-Hill, 301 p., illus., 1965. $6.95. The technology and science of space flight are examined and explained in detail. Specific facts and formulas are given as bases for statements on the development of space travel and predictions for its future. (A)

SUTTON, RICHARD M. THE PHYSICS OF SPACE. Holt, 176 p., illus., 1965. Paperback, $1.96. Space science and its relationship to the study of physics. Explains the nature and structure of the universe and some of the latest discoveries in space in terms which the student and layman can understand. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

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Manned Space Flight

Books in this section explain the problems and goals of manned space flight—especially the successfully concluded Gemini series and manned lunar exploration under Project Apollo. Astronauts and their training, space medicine, manned space stations, rendezvous in space, and manned space flight programs beyond Apollo including the possibilities for interstellar travel are also discussed. Additional general information on some of these subjects may be found in books listed in this bibliography on pages 7 and 8. Also see Table of Contents, Part IV, Teaching Aids.

CAIDIN, MARTIN. THE GREATEST CHALLENGE. Dutton, 320 p., illus., 1965. $5.95. The physical and mental hazards of manned exploration of space beyond the moon are evaluated. (S-A)

CALLOWAY, DORIS, editor. CONFERENCE ON HUMAN ECOLOGY IN SPACE FLIGHT. New York Academy of Sciences, 285 p., illus. 1966. $7. Proceedings of a conference held in 1963, reporting the spontaneous reactions of a group of 20 experts to problems and questions related to man in space. Semi-technical. (A)

CHESTER, MICHAEL. LET'S GO TO THE MOON. Putnam, 47 p., illus., 1965. $1.97, library edition. The reader takes an imaginary trip to the moon during which he learns about the experiences and duties our astronauts will have when they make their first voyage under Project Apollo. (I)

CONFERENCE ON NUTRITION IN SPACE AND RELATED WASTE PROBLEMS. Supt. of Doc. #NAS 1.21:70. 400 p., illus., 1965. $2.75. Proceedings of a conference held at the University of South Florida in 1964 at which Government, industry and university scientists considered the nutrition and waste problems of astronauts in space, especially over a long period of time. Approximately 60 papers are included. (S-A)

COOMBS, CHARLES. PROJECT APOLLO. MISSION TO THE MOON. Morrow, 96 p., illus., 1965. $2.95. A simple explanation of the proposed three-man journey to the moon—from launching to return to earth—written in graphic style as though the flight were actually under way. (I-U)

FACET, MAX. MANNED SPACE FLIGHT. Holt, 168 p., illus., 1965. Paperback, $1.96. The development of manned spacecraft and the problems and their solutions in training astronauts. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

FALLACI, ORIANA. IF THE SUN DIES. Atheneum, 403 p., 1966. $7.50. An Italian woman writer, who spent a year among the NASA astronauts and scientists, gives her personal impressions about the human side of the space program and its effects upon the lives of these people, as well as upon the human race in the future. (A)

GEMINI: AMERICA'S HISTORIC WALK IN SPACE. Prentice, 104 p., illus., 1965. Out of print. United Press International newsmen draw on UPI news and photographic files to record the Gemini 4 flight from launch to recovery. Astronaut White's walk in space is especially featured. (U-S-A)

GEMINI MIDPROGRAM CONFERENCE. Supt. of Documents #NAS 1.21:121, 443 p., illus., 1966. $2.75. Reports from a conference held at the Manned Spacecraft Center, Houston, Texas, Feb. 24-25, 1966. Presents 46 papers describing the spacecraft and launch vehicle, flight operations, mission results and accounts of the Gemini VI-A and VII rendezvous, the astronauts' reactions to the flight and in-flight experiments. (S-A)

GURNEY, GENE. WALK IN SPACE: The Story of Project Gemini. Random, 192 p., illus., 1967. $1.95. An account of the two-man space flights of Project Gemini, emphasizing the achievements which have brought America closer to a manned landing on the moon. (U-S)

HENRY, JAMES P. BIOMEDICAL ASPECTS OF SPACE FLIGHT. Holt, 174 p., illus., 1966. Paperback, $1.96. The many physiological problems facing men as they go into space and how these are being solved. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

HILTON, WILLIAM F. MANNED SATELLITES: THEIR ACHIEVEMENTS AND POTENTIALITIES. Harper, 140 p., illus., 1966. $3.50. A British scientist de-

scribes man's first efforts to get into space, the economics and uses of circular and elliptical orbits, launching techniques, re-entry into the earth's atmosphere, the physical needs and the usefulness of man in space, propulsion systems, and space travel in the future. (S-A)

MACVEY, JOHN W. JOURNEY TO ALPHA CENTAURI. Macmillan, 256 p., illus., 1965. $5.95. A discussion of the possibilities of interstellar travel of the far distant future as seen in the experiences of a hypothetical family, eight generations of which span the 215-year journey from Earth to this "close" star. (S-A)

MAYAK, LAWRENCE. SURVIVAL ON THE MOON. Macmillan, 159 p., illus., 1966. $3.95. How man will live on the moon, and lunar conditions that will require man to adapt to unfamiliar environment. (S-A)

OLNEY, ROSS. AMERICANS IN SPACE. Nelson, 176 p., illus., rev., 1967. $3.25. A summary of advances in manned space flight in the U.S., with a look into the future. Includes accounts of Astronaut Shepard's flight in May 1961, through manned flights terminating in the Gemini series in 1966. (U-S)

SCHARFF, ROBERT. INTO SPACE WITH THE ASTRONAUTS. 48 p., illus., 1965. Available from Merrill in "Special School Edition", $1.60 An accounting of the feats performed by astronauts to date of publication. (U)

SECOND SYMPOSIUM ON PROTECTION AGAINST RADIATIONS IN SPACE. Supt. of Documents, #NAS 1.21:71. 551 p., illus., 1965. $3.25. Reports from a symposium held in Gatlinburg, Tenn. Oct. 12-14, 1964. Includes reports on the radiation environment, biological effects, effects on materials, and shielding. (S-A)

SHAPP, MARTHA and CHARLES SHAPP. LET'S FIND OUT ABOUT THE MOON. Watts, 55 p., illus., 1965. $2.65. Aspects and features of the moon are explained in describing how astronauts will survive when they explore the moon. (P)

STAMBLER, IRWIN. ORBITING STATIONS: STOPOVERS TO SPACE TRAVEL. Putnam, 95 p., illus., 1965. $3.29. Explains the research and experimental vehicles leading to tomorrow's space stations. Discusses how they will be built and manned and their future contributions to the exploration of space. (U-S)

STRONG, JAMES. FLIGHT TO THE STARS. Hart, 178 p., illus., 1965. $4.95. Available in paper covers, $1.45. An inquiry into the feasibility of interstellar flight, based on knowledge drawn from the science of astronomy, astrophysics, cosmobiology, geology, and from nuclear engineering and astro-navigation. (S-A)

WUNDER, CHARLES C. LIFE INTO SPACE. F. A. Davis Co., 324 p., illus., 1966. $9.50. An introduction to space biology that considers the problems of carrying life into space. While the book is written for the scientists who need to expand and update their knowledge of space biology, the first four chapters are introductory in nature and can be understood by the general reader. The remaining chapters are more technical. (A)

Unmanned Satellites and Space Probes

Books in this section explain the development, uses, and accomplishments of unmanned satellites and space probes. Weather, navigation and communication satellites, the Ranger and Surveyor spacecraft for exploring the moon, and the Mariner space probes that investigated Venus and Mars are examined in detail. More general information on these subjects may be found in books listed under "Space Science and Technology" in this bibliography, and also in books listed on pages 7 and 8. Also see Table of Contents, Part IV, Teaching Aids.

BESTER, ALFRED. THE LIFE AND DEATH OF A SATELLITE. Little, Brown, 239 p., illus., 1966. $5.95. Unmanned satellites, their development, uses, and accomplishments including how satellites are built and the problems of constructing them, how they are launched and tracked, orbits and trajectories, missions and telemetry and data processing. (S)

BRANLEY, FRANKLYN M. MARS: PLANET NUMBER FOUR. Crowell, 130 p., illus., rev. 1966. $4.50. Facts about

Mars and what the *Mariner IV* spacecraft disclosed about this planet. Also discusses the possibilities of finding life on Mars, the pros and cons about the "canals" on Mars, and the problems that must be solved before the exploration of Mars is realized. (U-S)

CHESTER, MICHAEL. ROBOTS IN SPACE. Putnam, 128 p., illus., 1965. $3.50. Two types of space robots—satellites and probes—are discussed in relation to their use in gathering necessary information about the moon and planets before man can explore them himself. Explains Ranger, Mariner, Surveyor, TIROS and other spacecraft. (U-S)

CORLISS, WILLIAM. SPACE PROBES AND PLANETARY EXPLORATION. Van Nostrand, 542 p., illus., 1965. $7.75. A comprehensive report on the objectives of unmanned spacecraft and the equipment necessary to fulfill their missions. Emphasis is on instrumentation rather than results and their interpretation. Written under the sponsorship of the National Aeronautics and Space Administration. Semi-technical. (A)

HUBERT, LESTER F. and PAUL E. LEHR. WEATHER SATELLITES. Blaisdell, 120 p., illus., 1967. Paperback, $2.50. Explains the manner in which weather satellite observations are interpreted and used. Also discusses the history of meteorological satellites, their equipment, data acquisition and reduction, and what we may expect from future weather satellites. (S-A)

JAFFE, LEONARD. COMMUNICATIONS IN SPACE. Holt, 167 p., illus., 1966. Paperback, $1.96. The development of satellites to transmit radio and television signals from one point on earth to another. Explains theories involved and the workings of Echo, Relay, Telstar and Syncom satellites. Also considers the future of this mode of communication. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

JAKES, JOHN. TIROS: WEATHER EYE IN SPACE. Messner, 192 p., illus., 1966. $3.95. The development of weather satellites with emphasis on the TIROS series of meteorological spacecraft. Also traces the history of weather observation and forecasting. (U-S)

KNIGHT, DAVID C. THE FIRST BOOK OF MARS. Watts, 96 p., illus., 1966. $2.65. A record of the latest findings about Mars, gathered by the spacecraft Mariner IV during its "fly by" of the planet in 1965. Also includes information gathered through astronomical instruments. (U-S)

LEY, WILLY. RANGER TO THE MOON. Signet, 127 p., illus., 1965. Paperback, 60 cents. The story of the lunar space probe, Ranger VII and the significance of the close-up pictures of the moon's surface sent back to earth. (S-A)

LUKASHOK, ALVIN. COMMUNICATIONS SATELLITES: HOW THEY WORK. Putnam, 160 p., illus., 1967. $2.86. Simple explanations of the scientific principles behind the operation of communications satellites, such as signal transmission, amplification and reception, power generation and satellite tracking. (I-U-S)

MUELLER, ROBERT E. EYES IN SPACE. Day, 159 p., illus., 1965. $3.75. Satellites, telescopes, balloons and space observatories are only a few ways man has extended his vision into space. How and what man in the future will be seeing in the far reaches of the universe. (U-S)

NAUGLE, JOHN E. UNMANNED SPACE FLIGHT. Holt, 160 p., illus., 1965. Paperback, $1.96. The many scientific experiments carried on by instrumented unmanned satellites and space probes. Describes science as practiced in space, the important results and new knowledge gained. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

OHRING, GEORGE. WEATHER ON THE PLANETS. Anchor, 146 p., illus., 1966. Paperback, $1.25. How meteorologists obtain information about planetary atmospheres and how it is used by earth-bound weather forecasters and climatologists. (S-A)

VAETH, J. GORDON. WEATHER EYES IN THE SKY. Ronald, 124 p., illus., 1965. $5. The development and operation of weather satellites. New techniques of weather observation resulting from the space program and what we may expect from weather forecasting in the future using these new techniques. (S-A)

WIDGER, WILLIAM K., JR. METEOROLOGICAL SATELLITES. Holt, 272 p., illus., 1966. Paperback, $1.96. The applications of spacecraft to meteorological observations and weather forecasting, and a study of the development and operation of the TIROS and Nimbus weather satellites. Also discusses more sophisticated weather satellites of the future. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

Rocketry

Books in this section furnish information about rocket technology such as the principles of rocket propulsion, rocket fuels, the uses of rockets and rocket launchings. Also included are books about the history of rocketry and model rocketry programs. Additional general information on rocket technology may be located in books listed on pages 7 and 8 of this bibliography. Also see Table of Contents, Part IV, Teaching Aids.

AKENS, DAVID S. A PICTURE HISTORY OF ROCKETS AND ROCKETRY. Strode, 235 p., revised 1966. $5.95. A selection of historic rocket and rocketry photographs from the early achievements of Tsiolkovsky and Goddard through the 1966 photographic results of Surveyor I's mission to the moon. Project Gemini is covered through the Gemini IV flight in 1965. Numerous Russian cosmonaut pictures are included. (U-S-A)

HERTZ, LOUIS H. THE COMPLETE BOOK OF MODEL AIRCRAFT, SPACECRAFT AND ROCKETS. Crown, 278 p., illus., 1967. $6.95. What the model aviation and space hobbyist needs to know about selecting, building, flying and launching model aircraft and spacecraft, with emphasis on safety. (S-A)

HUNTER, MAXWELL W., II. THRUST INTO SPACE. Holt, 192 p., illus., 1966. Paperback, $1.96. The basic concepts and laws of rocketry, including requirements for interplanetary and interstellar travel. Investigates problems, and the mechanics and dynamics of various types of space flights. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

MAY, JULIAN. ROCKETS. Follett, 32 p., illus., 1967. $1. A brief history of rocketry with explanations of the principles of rocket propulsion and the uses of rockets—written for the beginning reader. (P)

STEPHENS, C. E. MODEL ROCKET HANDBOOK. Fantasia, 96 p., illus., 1965. Out of print. General information about model rockets, and technical information about constructing them. Also includes a chapter on the history of rocketry and its future. (S-A)

STINE, G. HARRY. A HANDBOOK OF MODEL ROCKETRY. Follett, 304 p., illus., rev., 1967. $6.95. Paperback, $4.95. A comprehensive book about how to safely build and launch model rockets, including calculations for designing, tracking, etc. Also accurate descriptions of materials and methods, and information on organizing a model rocketry club that can be affiliated with the National Association of Rocketry. (U-S)

VICTOR, EDWARD. PLANES AND ROCKETS. Follett, 32 p., illus., 1965. $1. A simple and graphic explanation of an airplane and the basic principles of flight. Also includes simple explanations of rocket engines and fuels. (P-I)

VON BRAUN, WERNHER and FREDERICK I. ORDWAY III. HISTORY OF ROCKETRY AND SPACE TRAVEL. Crowell, 244 p., illus., 1966. $14.95. A comprehensive history, international in scope, illustrated with more than 280 drawings, photographs and color plates. Includes the pioneering work of Goddard, Oberth and Tsiolkovsky, the German team at Peenemunde, and the development of space exploration through the Gemini flights and plans for Project Apollo. Tables of rocketry and spacecraft data, and a bibliography are provided. (S-A)

Astronomy

Books in this section survey the sun, the moon and members of the solar system as well as stars, galaxies and other natural objects in space. Other topics discussed are radioastronomy, how to build and use a telescope, how to locate and identify objects in the night sky, modern astronomical methods, and the ways in which spacecraft have increased our knowledge of space. Further information on these subjects may be found in books listed under "Space Science and Technology" and "Extraterrestrial Life." Less detailed material may also be found in books listed in pages 7 and 8. Also see Table of Contents, Part IV, Teaching Aids.

ASIMOV, ISAAC. THE MOON. Follett, 32 p., illus., 1966. $1. Presents the movements of the moon, its eclipses, phases and possible landscape. (P)

BALDWIN, RALPH. A FUNDAMENTAL SURVEY OF THE MOON. McGraw, 149 p., 1965. $4.95. A summary of knowledge of the moon—origin, tides, surface features and how they may have been formed. Data from Ranger spacecraft are included. (S-A)

BERGAUST, ERIK. MARS: Planet for Conquest. Putnam, 96 p., illus., 1967. $2.86. Reviews the knowledge we have of Mars through telescopic studies and the Mariner fly-by, and discusses possible new facts we may learn about this planet in the near future. (I-U)

BRANLEY, FRANKLYN M. EXPERIMENTS IN SKY WATCHING. Crowell, 111 p., illus., revised 1967. $3.95. Directions for locating major heavenly bodies including many helpful facts such as the positions of the planets by months through 1976. Also discusses the moon, planets, the sun, stars, and comets and their movements. Includes directions for making simple devices to aid in sky watching. (U-S)

_____ A BOOK OF PLANETS FOR YOU. Crowell, 57 p., illus., revised 1966. $3.95. The nine planets of our solar system, and their satellites, are described, and their sizes and temperatures are discussed. Simple experiments show how the planets revolve and rotate, and their location in relation to earth and to each other. (P)

_____ THE NINE PLANETS. Crowell, 77 p., illus., updated 1966. $3.50. A guide to Earth's neighbors in the solar system, updated to include findings from Mariner space probes and radio telescopes. (U)

CHAMBERLAIN, JOSEPH M. and THOMAS D. NICHOLSON. PLANETS, STARS AND SPACE. Creative, 224 p., illus., revised 1967. $5.95. An explanation of the earth as a typical planet, the sun as a typical star, and such phenomena as meteors and the Milky Way. Reviews some of the star patterns throughout the year and includes unusual astronomical photographs. (I-U)

FANNING, A. E. PLANETS, STARS AND GALAXIES. Dover, 189 p., illus., revised 1966. Paperback, $1.35. A book for those with a beginning interest in astronomy. Includes descriptions of the solar system, stars and galaxies, and discussions of methods used by today's astronomers to gather knowledge of the heavens. The moon's surface as disclosed by U.S. spacecraft is described. (S-A)

GALLANT, ROY A. EXPLORING THE PLANETS. Doubleday, 128 p., illus., revised 1967. $4.50. A non-technical description of our solar system. (I-U)

_____ EXPLORING THE MOON. Doubleday, 64 p., illus., revised 1966. $3.75. Shows the reader the fascinating things to be seen on the moon. (I-U)

HESS, WILMOT N., DONALD H. MENZEL, and JOHN A. O'KEEFE. THE NATURE OF THE LUNAR SURFACE. Johns Hopkins Press, 320 p., illus., 1966. $13.50. Proceedings of a symposium held under the auspices of Commission 17 (The Moon) of the International Astronomical Union, April 1965. Discusses interpretations of Ranger spacecraft photographs, crater formation and surface structure, and the physics and chemistry of the lunar surface. Semi-technical. (S-A)

HOYLE, FRED. MAN IN THE UNIVERSE. Columbia University Press, 81 p., 1966. $3.50. A noted British astronomer presents his views of the state of astronomy today and his opinions of projects for space exploration and observation as they relate to astronomy. (S-A)

HYNEK, J. ALLEN AND NORMAN D. ANDERSON. CHALLENGE OF THE UNIVERSE. Scholastic, 143 p., illus., revised 1965. Paperback, 50 cents. Facts and theories about the universe and modern techniques for exploring the heavens are explained. This book is one of the Vistas of Science series produced as a joint project of the National Science Teachers Association and the National Aeronautics and Space Administration. (S)

JACKSON, JOSEPH H. PICTORIAL GUIDE TO THE PLANETS. Crowell, 216 p., illus., 1965. $7.95. Descriptions of the planets, earth, moon, asteroids, meteors, comets and artificial satellites. Outlines principles of rocketry and space vehicle operation, and discusses the problems of manned space flight and extraterrestrial life. (S-A)

JOHNSON, GAYLORD and IRVING ADLER. DISCOVER THE STARS. Sentinel, 128 p., illus., revised 1965. Paperback, $1. A beginner's guide to astronomy with emphasis on the moon and its movements. Includes instructions for making and using a telescope and explains in simple analogies astronomical terms. (U-S)

JOSEPH, JOSEPH M. and SARAH LEE LIPPINCOTT. POINT TO THE STARS. McGraw, 32 p., illus., revised 1967. $3.95. A book for beginning astronomers to use outdoors as a guide to locate well-known planets, constellations and stars. Includes a "face and point" method for helping to discover locations. The book has been updated to include artificial satellites, with star charts updated to 1971. (I-U)

KIEFER, MILDRED S. PLANET X. Melmont, 64 p., illus., new ed. 1965. $1.50. A boy's interest in astronomy leads him to discover how astronomers work and shows him the value of accurate scientific knowledge in the conquest of space. (P-I)

KING, HENRY C. THE WORLD OF THE MOON. Barrie and Rockliff, 125 p., illus., 1966. $5.25. Discusses the origin, movement, surface features and moon problems. (S)

LEAR, JOHN. KEPLER'S DREAM. Univ. of California Press, 182 p., 1965. $5. The first complete English translation of Kepler's masterpiece describing a voyage to the moon, with the author's interpretation of Kepler's manuscript. (A)

LYON, JENE. OUR SUN AND THE WORLDS AROUND IT. Golden, 64 p., illus., revised 1965. $1.99. Basic information about the sun and planets, asteroids, comets and meteors. Also discusses rockets, telescopes, and artificial satellites. (I)

MOORE, PATRICK. THE NEW LOOK OF THE UNIVERSE. Norton, 126 p., illus., 1966. $3.95. A layman's guide to the latest ideas about space and the universe. Explains how unmanned spacecraft and radio telescopes have contributed to knowledge about the planets, universe and galaxies. (S-A)

NASA 1965 SUMMER CONFERENCE ON LUNAR EXPLORATION AND SCIENCE. #NAS 1.21:88. Supt. of Documents, 421 p., illus., 1965. Paperback, $1.50. Report of conference held July 19-31, 1965 at Falmouth, Mass., at which discussions were held on the overall lunar mission, geodesy/cartography, geology, geophysics, bioscience, lunar atmosphere measurements, and astronomy. Conclusions and recommendations are also included in the report. (A)

PAGE, THORTON and LOU WILLIAMS PAGE, editors. TELESCOPES: HOW TO MAKE THEM AND USE THEM. Macmillan, 338 p., illus., 1966. $7.95. A collection of articles from past issues of SKY AND TELESCOPE give the history of telescopes and include instructions for selecting telescope parts, assembling, adjusting, and using telescopes. (S-A)

_____ NEIGHBORS OF THE EARTH. Vol. 2, Macmillan, 336 p., illus., 1965. $7.95. An anthology of more than 100 articles from the astronomy journal, SKY AND TELESCOPE, discussing the discoveries of the past thirty years that have given us a deeper understanding of the environments and surface characteristics of the other planets in our solar system. Emphasis is on discoveries made by satellites and space probes. (S-A)

_____ WANDERERS IN THE SKY. Macmillan, 338 p., illus., 1965. $7.95. A collection of approximately 100 articles from a leading astronomy magazine relating to developments in astronomy that have made space exploration and technology possible. Articles cover such subjects as space probes, the hazards of matter in space, and the moon. (S-A)

_____ THE ORIGIN OF THE SOLAR SYSTEM. Macmillan, 336 p., illus., 1966. $7.95. An anthology of 75 articles from the astronomy journal, SKY AND TELESCOPE, which includes a number of space-related pieces concerning life on other worlds, earth observations from satellites, lunar photography, manned exploration of Mars, radio astronomy and other pertinent subjects. (S-A)

PAUL, HENRY E. TELESCOPES FOR SKYGAZING. Chilton, 160 p., illus., revised 1965. $4.95. A source of information and advice for amateurs about

building or buying a telescope. Also discusses how to test and use telescopes, binoculars for skygazing, and astronomical photography. (U-S-A)

ROSEN, EDWARD. KEPLER'S CONVERSATION WITH GALILEO'S SIDEREAL MESSENGER. Johnson, 164 p., 1965. $9. Originally published in 1610, this book reprints, with commentaries, Kepler's reactions to Galileo's telescopic findings. (A)

STERN, PHILLIP D. OUR SPACE ENVIRONMENT. Holt, 160 p., illus., 1965. Paperback, $1.96. A practical guide to the planets, comets, and stars and a discussion of facts and theories about the universe resulting from the exploration of space. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

WARSHOFSKY, FRED. TARGET MOON. Four Winds Press, 128 p., illus., 1966. $2.50. The moon is surveyed including ancient beliefs about its origin, modern scientific facts about the moon, and Project Apollo—man's plans for reaching that target. (U-S)

WYLER, ROSE and GERALD AMES. THE NEW GOLDEN BOOK OF ASTRONOMY. Golden, 104 p., illus., rev. 1965. $3.99. An introduction to space with accounts of developments in astronomy and achievements in space exploration. (U)

Extraterrestrial Life

Books in this section explore the possibility of life beyond the earth. They report on what scientists know about environments of the planets and their ability to sustain life forms, the ways and means of searching for life in space, the possibilities for and against finding intelligent life outside the earth, and contamination resulting from man's physical contact with other members of the solar system. Additional information on these subjects may be found in some of the books listed in the section entitled "Astronomy."

ALLEN, TOM. THE QUEST: A REPORT ON EXTRATERRESTRIAL LIFE. Chilton, 323 p., illus., 1965. $4.95. What scientists know and what they hope to learn about the existence of living things beyond the earth and its atmosphere. (S-A)

HANRAHAN, JAMES. S., editor. THE SEARCH FOR EXTRATERRESTRIAL LIFE. Vol. 22. American Astronautical Society, 378 p., 1967. $15.75. A survey of current knowledge of extraterrestrial life including the basis of the search, vehicles and methods required for the search, life beyond the solar system and the implications of the discovery of extraterrestrial life. (S-A)

HEINTZE, CARL. SEARCH AMONG THE STARS. Van Nostrand, 175 p., illus., 1966. $4.50. Exobiology, the study of the possibility of life outside the earth, is explained for young readers. Discusses the requirements for life to exist, the likelihood of finding these conditions on other planets, radio astronomy, and the results of manned and unmanned spacecraft exploration in man's search for extraterrestrial life. (I-U)

HOLMES, DAVID C. SEARCH FOR LIFE IN OTHER WORLDS. Sterling, 224 p., illus., 1967. $3.95. Discusses the probabilities for and against finding life on other planets, and the role of radio in discovering extraterrestrial life. Reviews the history of investigation of life beyond the earth from ancient times to the present. (U-S)

JACKSON, FRANCIS and PATRICK MOORE. LIFE ON MARS. Norton, 111 p., illus., 1965. $4.50. A survey of the arguments for and against finding life on Mars and a discussion of surface and atmospheric conditions on this planet, the results of laboratory studies made under simulated Martian conditions, and the search for life on Mars. (S-A)

MacGOWAN, ROGER A. and FREDERICK I. ORDWAY, III. INTELLIGENCE IN THE UNIVERSE. Prentice, 402 p., illus., 1966. $13.50. An analysis of the major factors determining the probability of intelligent life in the universe. Surveys possibilities of communicating with life outside the solar system and considers biological thinking and the possible role of "intelligent automata" among extrasolar societies. (A)

MOFFAT, SAMUEL and ELIE A. SHNEOUR. LIFE BEYOND THE EARTH. Scholastic, 160 p., illus., 1965. Paperback, 50 cents. Also available in hard covers from Four Winds Press at $2.95. How the biological sciences are contributing to our knowledge of space. Life on other planets and the problem of contaminating our neighbors in space with earth-derived organisms are discussed. This book is one in the Vistas of Science series developed as a joint project of the National Science Teachers Association and the National Aeronautics and Space Administration. Epilogue by Joshua Lederberg. (U-S)

ORDWAY, FREDERICK I., III. LIFE IN OTHER SOLAR SYSTEMS. Dutton, 96 p., illus., 1965. $3.75. Scientific facts on which astronomers base their reasons regarding the possibilities of life beyond our solar system. Discusses possible ways and means of detecting extrasolar life and communicating with it. (S-A)

PITTENDRIGH, COLIN S., WOLF VISHNIAC and J. P. T. PEARMAN, editors. BIOLOGY AND THE EXPLORATION OF MARS. National Academy of Sciences, 516 p., illus., 1966. $7.50. Report of a study held under the auspices of the Space Science Board which discusses the feasibility of plans for the biological study of Mars, investigation of problems and awards of such a project, the recognition of life forms, manned and unmanned Mars landings, and avoiding contamination of Mars. Semi-technical. (A)

SHKLOVSKII, I. S. and CARL SAGAN. INTELLIGENT LIFE IN THE UNIVERSE. Holden-Day, 509 p., illus., 1966. $9.95. Collaboration by Soviet and American scientists in presenting a summary of the present state of scientific knowledge and philosophical interest in the possibilities of extraterrestrial life. (A)

SULLIVAN, WALTER. WE ARE NOT ALONE. McGraw-Hill, 325 p., illus., revised 1966. $7.50. An updating of the original 1964 edition, which examines the latest findings supporting the theory that life exists beyond the earth. Discusses the history of man's attempts to communicate with other worlds, and explores many questions that may arise if extraterrestrial life is discovered. (S-A)

YOUNG, RICHARD S. EXTRATERRESTRIAL BIOLOGY. Holt, 121 p., illus., 1966. Paperback, $1.96. A discussion of the possibilities of life on other planets with respect to ancient and recent theories of the origin of life. Descriptions of experimental investigations being carried on in laboratories and in space. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

History of Space Flight and Biographies of Space Pioneers and Leaders

Books in this section present the history of rocket research and space exploration, and the lives of pioneer scientists and of today's leaders in rocketry, space medicine, space technology and astronomy.

CAMPBELL, PAUL A. EARTHMAN/SPACEMAN/UNIVERSAL MAN. Pageant, 229 p., illus., 1965. $5. A former Director of Research and later Commander of the Air University's School of Aviation Medicine traces the history of man's "cosmic consciousness" and discusses the unprecedented vistas opening up to man through the exploration of space. The author's background provides medical overtones as he points out how man has successfully overcome the first line of barriers to traveling in space. (A)

COOMBS, CHARLES. ROCKET PIONEER. Harper, 256 p., illus., 1965. $2.76. The story of Robert Goddard's life written in a style of interest to children. One of the titles in *The American Adventure Series,* Emmett Betts, editor. (I-U)

COX, DONALD W. AMERICA'S EXPLORERS OF SPACE. Hammond, 93 p., illus., 1967. $3.50. Capsule biographies of 16 men who have contributed to the advancement of our knowledge of space. Includes pioneers of research and development as well as men who pioneered in flight. (U-S)

DAVID, HEATHER. WERNHER von BRAUN. Putnam, 255 p., 1967. $3.64. A biography of one of Germany's World War II pioneer rocketeers who has con-

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tributed substantially to our nation's space program since his emigration to the United States. (U-S)

DILLE, JOHN. AMERICANS IN SPACE. Harper, 155 p., illus., 1965. $4.95. A history of our national space program through Project Mercury including a brief summary of the beginnings of rocketry on which our space program was founded. (I-U)

EMME, EUGENE M. A HISTORY OF SPACE FLIGHT. Holt, 192 p., illus., 1965. Paperback, $1.96. A narrative of the dramatic efforts in the development of space flight on a world-wide basis. A concise history of major milestones in space. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

GODDARD, ROBERT H. THE AUTOBIOGRAPHY OF ROBERT HUTCHINGS GODDARD, FATHER OF THE SPACE AGE. St. Onge, 88 p., illus., not copyrighted. $5 (limited edition). This miniature book, 2" x 2-3/4", contains the autobiography of Dr. Goddard covering his years up to 1927. It is a limited edition of 1,926 copies, bound in blue polished calf, printed on rag paper, gold stamped and with all edges gilt. Also includes the address by former Postmaster General John A. Gronouski at the unveiling of the design of the Goddard commemorative airmail stamp, as well as the mint stamp. (S-A)

GREGOR, ARTHUR S. GALILEO. Scribners, 192 p., illus., 1965. $3.50. The life and work of a pioneer of astronomy, written for children. (I-U)

KNIGHT, DAVID C. COPERNICUS: TITAN OF MODERN ASTRONOMY. Watts, 192 p., illus., 1965. $2.95. A biography of a pioneer astronomer describing his education, environment, and accomplishments. (U-S)

LAUBER, PATRICIA. BIG DREAMS AND SMALL ROCKETS. Crowell, 71 p., illus., 1965. $3.75. A short history of space travel with emphasis on the three "fathers of space travel"—Tsiolkovsky, Goddard and Oberth. (I-U)

ROSHOLT, ROBERT L. ADMINISTRATIVE HISTORY OF NASA. Supt. of Documents, #NAS 1.21:4101, 381 p., illus., 1966. $4. Shows the development of America's accelerated program of space exploration, initiated by President Kennedy, including the landing of astronauts on the moon and how NASA intends to accomplish this mission. (A)

SHELTON, WILLIAM R. AMERICAN SPACE EXPLORATION. Little, Brown, 320 p., illus., 1967. $5.95. The story of the first ten years of U.S. exploration of space, from the first launchings at Cape Canaveral in the mid 1950's to early stages of Project Apollo. This historical development is based on the author's experiences during numerous launchings and interviews with astronauts, ground crews, military personnel, and scientists and engineers involved in the nation's space program. (S-A)

SWENSON, LOYD S., JR., JAMES M. GRIMWOOD, and CHARLES C. ALEXANDER. THIS NEW OCEAN. A HISTORY OF PROJECT MERCURY. NASA Sp-4201, Supt. of Documents, 681 p., illus., 1966. $5.50. A complete, authoritative history of the U. S. first manned spaceflight program—Project Mercury, covering the research involved in laying the groundwork for the project; the development of Project Mercury spacecraft and training of the astronauts; and finally, the Mercury missions. Also includes numerous footnotes, a selected bibliography and many appendices with charts. (S-A)

THOMAS, SHIRLEY. MEN OF SPACE, Vol. 7, Chilton, 279 p., illus., 1965. $6.95. Profiles of ten men who are shaping the Space Age: Charyk, Freitag, Friedman, Goett, Grissom, Haley, Henry, Parks, Putt and Welsh. (S-A)

WILKIE, KATHARINE E. MARIA MITCHELL: STARGAZER. Garrard, 80 p., illus., 1966. $1.98. A child's biography of a pioneering woman astronomer. (I)

WRIGHT, HELEN. EXPLORER OF THE UNIVERSE: A BIOGRAPHY OF GEORGE ELLERY HALE, Dutton, 464 p., illus., 1966. $10. A definitive biography of the American astronomer who invented the spectroheliograph, organized and directed the Yerkes Observatory, the Mount Wilson and Palomar Observatories, and built the world's three largest telescopes including the 200-inch telescope at Palomar. (A)

Impacts of the Exploration of Space

Books in this section appraise the social, economic and political impacts of the space program. They discuss how space exploration is benefiting mankind today, how it is affecting international relations, the need for space law, the role of the aerospace industry and its effects on society, the possible long range consequences of exploring space, and other questions raised by man's conquest of space.

BADGLEY, PETER C., editor. SCIENTIFIC EXPERIMENTS FOR MANNED ORBITAL FLIGHT. Vol. 4. AAS Science and Technology Series. American Astronautical Society, 358 p., illus., 1965. $14.25. A collection of symposium papers giving views of the great potential contributions to agriculture and forestry, geology, oceanography, astronomy, meteorology, etc., through the use of scientific experiments in manned satellites. Semi-technical. (S-A)

BAUER, RAYMOND A., editor. SOCIAL INDICATORS. M.I.T. Press, 357 p., 1966. $10. Examines the need to anticipate the consequences of change, especially those resulting from the wide ranging nature of the space program and its effects on society. This book was written under a NASA grant to the American Academy of Arts and Sciences. (A)

BOVA, BEN. THE USES OF SPACE. Holt, 144 p., illus., 1965. $3.50. Explains why man is involved in the exploration of space and how such exploration can benefit human life everywhere. Considers manned orbiting laboratories, moon bases, exploration of the moon, and the value of the planets in our solar system. (S)

CAIDIN, MARTIN. WHY SPACE? AND HOW IT SERVES YOU IN YOUR DAILY LIFE. Messner, 208 p., illus., 1965. $4.95. The break-throughs of space technology and how they are benefiting our lives today. Numerous specific instances are cited where the growth of knowledge engendered by our space program and its application are bettering our lives today. (S-A)

COLE, DANDRIDGE M. BEYOND TOMORROW. Amherst Press, 168 p., illus., 1965. $7.50. A scientist looks ahead to the next 50 years of exploring space. (S-A)

EVANS, F. T. and H. D. HOWARD. OUTLOOK ON SPACE. Available through Hillary House, 179 p., illus., 1965. $5.50. A British publication that discusses the development of space research and international organization. Shows the impact that advancing technology, as exemplified by space research, has upon a changing international society. (A)

FRUTKIN, ARNOLD W. INTERNATIONAL COOPERATION IN SPACE. Prentice, 192 p., 1965. *Out of print.* Explores man's future in space, the role of the National Aeronautics and Space Administration, and the importance of international cooperation if man is to achieve his ultimate destiny in space. (A)

FRYE, WILLIAM E., editor. IMPACT OF SPACE EXPLORATION ON SOCIETY. Vol. 8, AAS Science and Technology Series. American Astronautical Society, 370 p., illus., 1966. $14.25. Papers presented at the 1965 meeting of the American Astronautical Society discussing the social, educational, technological, international, practical and economic effects of our space program on society. (S-A)

GIBNEY, FRANK and GEORGE J. FELDMAN. THE RELUCTANT SPACE-FARERS. New American Library, 200 p., 1965. $4.50. Discusses the political and economic consequences of America's space effort. An appraisal of the space program as it relates to our changing economy. (U-S)

GOODWIN, HAROLD L. THE IMAGES OF SPACE. Holt, 189 p., 1965. Paperback, $1.96. The effects of space exploration successes and failures on the struggle between the democratic and communistic ideologies. Interesting historical space events; their political, economic, social and moral implications, and their contribution to national images. One of 14 volumes in the SPACE SCIENCE SERIES. (S)

HYMAN, WILLIAM A. MAGNA CARTA OF SPACE. Amherst Press, 412 p., illus., 1966. $8.95. Discusses the urgent need for space law and offers a basic law for space activities, or "Magna Carta of Space". (A)

INTERNATIONAL COOPERATION AND ORGANIZATION FOR OUTER SPACE. Staff Report Prepared for the Committee on Aeronautical and Space Sciences, U.S. Senate, Supt. of Documents, #89-1:S. doc. 56. 580 p., illus., 1965. $2. A survey of

international space activities including reports on the U.S. space program and the space related projects of 39 other nations; western European space efforts; space activities of specialized agencies within the United Nations; and international scientific cooperation. (S-A)

KAVANAU, L. L., editor. PRACTICAL SPACE APPLICATIONS. Vol. 21, American Astronautical Society, approx. 500 p., 1967. $15.75. Discusses the practical applications resulting from our national space program such as communications, meteorological and navigational satellites, and the potential uses of spacecraft such as for surveying earth's natural resources and crops, and for medical purposes. (S-A)

KONECCI, EUGENE B. and others, editors. SPACE AGE IN FISCAL YEAR 2001. Vol. 10, Science and Technology Series, American Astronautical Society, 446 p., illus., 1967. $14.25. A look at the future of space as industry and government scientists and engineers discuss their ideas of how man's activities in space at the beginning of the 21st century will affect technology, transportation, commerce, education, city planning and many other facets of life. A good portion of the book is somewhat technical, but the remainder is not difficult for the advanced high school student and adults. (S-A)

LEVY, LILLIAN, editor. SPACE: ITS IMPACT ON MAN AND SOCIETY. Norton, 228 p., 1965. $4.50. Outstanding authorities such as James Webb, John Glenn, Wm. Foster, and Bishop Pike discuss the effects of space exploration on mankind relating to disarmament, atomic power, education, religion, career opportunities, medicine, industry, etc. (A)

MAZLISH, BRUCE, editor. THE RAILROAD AND THE SPACE PROGRAM. M.I.T. Press, 223 p., 1965. $7.50. Nine university professors discuss the development of the nation's railroad system and its consequences, noting its similarities and differences with regard to the U.S. space program. They attempt to anticipate, by historical analogy, the long-range impacts of the space program for American society. (A)

MORENOFF, JEROME. WORLD PEACE THROUGH SPACE LAW. Michie, 340 p., illus., 1967. $10. The traditional rights of nations concerning reconnaissance, and how these rights might be reconciled in the Space Age under a proposed cooperative international system of surveillance. (A)

NIEBURG, H. L. IN THE NAME OF SCIENCE. Quadrangle Books, 431 p., 1966. $7.95. The Contract State is described and the role of the aerospace industry is defined in this critical analysis of research and development phases of the "scientific-military-industrial complex" in the U.S. (A)

RUZIC, NEIL. THE CASE FOR GOING TO THE MOON. Putnam, 240 p., illus., 1965. $4.95. A report on the scientific and long term commercial benefits expected from manned exploration of the moon based on a poll of thousands of space scientists and engineers. (S-A)

SCIENCE, GOVERNMENT AND THE UNIVERSITIES. Univ. of Washington Press, 116 p., 1966. $3.95. A symposium of scientists in government and in universities discuss various points of view about the relationship between the federal government and the nation's universities in regard to scientific research and development. Much of the discussion relates to space science efforts. (A)

STECKLER, HERMAN O. THE STRUCTURE AND PERFORMANCE OF THE AEROSPACE INDUSTRY. University of California Press, 223 p., 1965. $6.50. An analysis of the relationships existing between the federal government and private aerospace contractors. Covers the historical development of the aerospace industry, its major characteristics, the roles played by its various components, and an evaluation of its performance. (A)

THOMAS, SHIRLEY, editor. THEODORE VON KARMAN MEMORIAL SYMPOSIUM. American Astronautical Society, 127 p., illus., 1966. $11.25. Proceedings of a seminar involving leaders in the space program who discussed such topics as keeping peace in space, benefits from the space program, space law, and living in space. (S-A)

Careers

Books in this section analyze the numerous new careers developing within the space program. They discuss job qualifications, personal and educational requirements, earnings and benefits and outlook for the future. Some present careers in terms of the scientists and engineers working in the space program including the role of women.

AMSTEAD, B. H. and WILBOURN McNUTT. ENGINEERING AS A CAREER TODAY. Dodd-Mead, 207 p., illus., 1967. $3.75. A report on engineering as a career. Describes engineering in general, what an engineering college is like, kinds of work that an engineer does, how to choose the right college of engineering, rewards of the profession and outlook for the future. Also gives details about the work of chemical, civil, mechanical, and electrical engineers and a brief overview of aerospace engineering. The book concludes with three appendices: Accredited Colleges of Engineering in the United States, Code of Ethics for Engineers, and Engineering Societies in America. (S)

BOYD, WALDO T. YOUR CAREER IN THE AEROSPACE INDUSTRY. Messner, 222 p., illus., 1966. $3.95. An overview of the scope of the aerospace industry with emphasis on the wide range of job opportunities within the industry. Also discusses preparation for these careers, and suggests further sources of information. A bibliography is included. (U-S)

BREWER, FRED. CHALLENGERS OF THE UNKNOWN. Four Winds Press, 128 p., illus., 1965. $2.50. An account of activities of 13 scientists currently working on basic or applied research. Four of the thirteen scientists are involved in space-related research: spacesuits, space food, balloon-borne astronomical studies; and the study of roaches and their behavior in a space environment. (U-S)

CHILDERS, ALBERT and JAMES S. LOVE, editors. LISTEN TO LEADERS IN SCIENCE. McKay, 278 p., 1965. $5.50. Eighteen of the world's great scientists discuss their own careers and the accomplishments of their scientific fields. (S-A)

_____ LISTEN TO LEADERS IN ENGINEERING. McKay, 338 p., 1965. $5.95. Twenty-two successful engineers discuss their experiences and engineering fields. (S-A)

DEMBLING, MERWIN. SCIENTISTS ON SCIENCE. Dutton, 160 p., illus., 1965. $3.95. A selection of six talks to New York City science students given by working scientists who tell about and demonstrate the jobs they are doing. Discusses problem solving, electron tubes, solid-state physics, space technology, space propulsion and cryogenics. (S-A)

HOYT, MARY FINCH. AMERICAN WOMEN OF THE SPACE AGE. Atheneum, 88 p., illus., 1966. $3.50. An account of how women scientists, engineers and technicians are contributing to our nation's space program. The book cites numerous specific examples of their roles. (S)

HYDE, WAYNE. THE MEN BEHIND THE ASTRONAUTS. Dodd, Mead, 128 p., illus., 1965. $3.50. An account of the thousands of people whose work contributes to putting astronauts into orbit. (I-U)

MATTFIELD, JACQUELYN A. and CAROL G. VAN AKEN, editors. M.I.T. SYMPOSIUM ON AMERICAN WOMEN IN SCIENCE AND ENGINEERING. M.I.T. Press, 250 p., 1965. $6.95. Prominent men and women scientists and engineers discuss the personal, social and economic factors involved in a woman's professional career; the commitment required of a woman entering a science profession, who wants women in the science professions, and the case for and against the employment of women. (S-A)

McDONNELL, VIRGINIA. ASTRONAUTS' NURSE. Nelson, 126 p., illus., 1965. $2.75. The story of the Air Force nurse who was responsible for the daily health care of the seven Project Mercury astronauts and who subsequently has been designated as the first aerospace nurse. (U-S)

SELIGSOHN, I. J. YOUR CAREER IN COMPUTER PROGRAMMING. Messner, 222 p., illus., 1967. $3.95. An insight into computers and computer programming, emphasizing the personal and educational requirements for the job of computer programmer, and its relation to space technology. Cites success stories of people working in this career field and includes a bibliography and sources of further information. (S)

SPLAVER, SARAH. SOME DAY I'LL BE AN AEROSPACE ENGINEER. Hawthorn, 96 p., illus., 1967. $3.50. Describes the history of the aerospace engineering profession, personal characteristics considered desirable, education and training needed, the work performed and advantages of this career. (I-U)

Miscellaneous

Aeronautical Research

(The X-15 Rocket Research Aircraft, the Supersonic Transport, and Vertical Flight Aircraft)
Note: Aeronautical titles are limited to those dealing with research. For a broader treatment of aeronautics, the reader is referred to the AVIATION EDUCATION BIBLIOGRAPHY published by the National Aerospace Education Council.
(See page 26.)

HALACY, D. S., JR. 33 MILES A MINUTE! The Story of Air Transport. Messner, 192 p., illus., 1966. $3.95. The story of the evolution of supersonic flight with emphasis on jet aircraft, the future supersonic transport (SST), Mach 3 planes, and the sonic boom. (U-S)

HENDRICKSON, WALTER B., JR. WINGING INTO SPACE. Bobbs, 224 p., illus., 1965. $3.95. Much of this book discusses the X-15 rocket research aircraft and wingless lifting bodies that may serve as a space re-entry vehicle. The background of the discussion is Edwards Air Force Base where NASA, in cooperation with the U.S. Air Force and Navy, tests some of its advanced projects. (U-S)

STAMBLER, IRWIN. SUPERSONIC TRANSPORT. Putnam, 94 p., illus, 1965. $3.29. Describes the development of America's design for the 2,000-mph airliner of tomorrow, and the many difficult technical problems to be overcome before this airplane can become a reality. (U-S-A)

STUDY ON THE FEASIBILITY OF V/STOL CONCEPTS FOR SHORT HAUL TRANSPORT AIRCRAFT. Clearing House, #N 67-14938, 103 p., 1967. $3. An evaluation of vertical and short takeoff and landing experimental prototype aircraft, and their possibilities for use as short haul transport aircraft. Discusses speeds, ranges, capacities, operating costs, designs, propulsion, and other important factors. (S-A)

SWANBOROUGH, F. G. VERTICAL FLIGHT AIRCRAFT OF THE WORLD. Aero, 120 p., illus., 1965. $6. Facts, figures, and illustrations of today's many types of vertical flight aircraft from conventional helicopters to experimental convertiplanes. More than 80 aircraft from nine nations are included. (S-A)

Fiction for Primary Grade Students

CORSON, HAZEL. PETER AND THE MOON TRIP. Benefic, 96 p., illus., rev. 1965. $2.20. Peter, the son of a space scientist, has many unusual experiences as he travels to the moon. (P)

WASSERMAN, SELMA and JACK WASSERMAN. MOONBEAM AND THE ROCKET RIDE. Benefic, 64 p., illus., 1965. $1.96. A chimpanzee "astronaut" returns to earth after a rocket launch, escapes, and gives a family some exciting moments. (P)

_____ MOONBEAM AT THE ROCKET PORT. Benefic, 64 p., illus., 1965. $1.96. The adventures of a chimpanzee who is scheduled for space flight experimentation. (P)

_____ MOONBEAM AND DAN STARR. Benefic, 64 p., illus., 1966. $1.96. A chimpanzee "astronaut" hides aboard a manned spacecraft and, once in orbit, saves an astronaut's life. (P)

Other

HALACY, D. S., JR. BIONICS: THE SCIENCE OF "LIVING" MACHINES. Holiday, 192 p., illus., 1965. $4.50. An explanation of a new science that merges biology and engineering by adapting "life functions" to machines. Examples: heart stimulators and bacterial electric batteries. Some of this discussion is related to applications in future space exploration. (S)

_____. CYBORG: EVOLUTION OF THE SUPERMAN. Harper, 207 p., 1965. $3.95. An explanation of the possibilities of "cyborg"—a coined word meaning man plus machines—and its implications for the future—especially for extended voyages and even colonization in space. (S-A)

WELLS, ROBERT. BIONICS: NATURE'S WAYS FOR MAN'S MACHINES. Dodd, Mead, 160 p., illus., 1966. $3.50. How scientists develop mechanical systems by studying biological systems in nature; for example, sonar and air navigation systems that may be derived from the homing instincts of various animals. (I-U)

WOODBURY, DAVID O. THE FRIGID WORLD OF CRYOGENICS. Dodd, Mead, 96 p., illus., 1966. $2.99. What is being accomplished by scientists working with temperatures hundreds of degrees below zero —how such extreme cold is reached, how it is used today, and what its future importance may be. (U-S)

reference materials

part-II

Atlases

ATLAS OF THE MOON. Vincent de Callatay. St. Martin's, 160 p., illus., translated from the French, 1964 (original French edition, 1962). $15. Describes the moon's structure, motion and phases and includes a complete atlas of the moon's surface with detailed maps. Also discusses exploration by lunar spacecraft. (S-A)

MOON ATLAS. V. A. Firsoff. Viking, 32 p., illus., 1962. $10. A reference book that is both a general atlas and a report of the author's findings on the formative fractures of the lunar surface. (S-A)

RECTIFIED LUNAR ATLAS. E. A. Whitaker, G. P. Kuiper, W. K. Hartmann, and L. H. Spradley. Supplement No. 2 to the Photographic Lunar Atlas. University of Arizona Press, 143 p., illus., 1963. $35. Photographs of the entire visible lunar hemisphere as projected on a three-foot diameter globe to remove the major effects of foreshortening toward the limb. This technique reduces the overall contrast between the maria and the terrae and allows "the full dynamic range possessed by the printed plates to be applied to the retention of *local* contrast, both in the maria and on the terrae." (A)

Bibliographies

AAAS SCIENCE BOOK LIST FOR CHILDREN. Hilary J. Deason, compiler. American Association for the Advancement of Science, 201 p., 2nd ed., 1963. $2.50; paperback, $1.50. An evaluated and annotated list of 1,291 selected science titles for elementary school pupils. Includes books on astronomy and space travel. (P-I-U)

AAAS SCIENCE BOOK LIST FOR YOUNG ADULTS, THE. Hilary J. Deason, compiler. American Association for the Advancement of Science, 250 p., 1964. $3.50; paperback, $2.50. An enlarged and extensively revised replacement for the AAAS SCIENCE BOOK LIST published in 1959. Books listed are intended primarily for collateral reading and reference by students in grades 9 through 12. Numerous astronomy and space travel titles are included. (S)

AERONAUTICS AND SPACE BIBLIOGRAPHIES. Supt. of Documents. Selected, annotated lists of books on space, space exploration and aeronautical research subjects, including sources of related teaching aids, films and filmstrips. NASA publications:

AERONAUTICS AND SPACE BIBLIOGRAPHY FOR ELEMENTARY GRADES. 1961. #NAS 1.19:1. Listings cover books published from January 1958 through June 1961. 25 cents. (A)

AERONAUTICS AND SPACE BIBLIOGRAPHY FOR ELEMENTARY GRADES. Second ed., 1963. #NAS 1. 9/2:Ae8. Listings cover books published from January 1960 through March 1963. 30 cents. (A)

AERONAUTICS AND SPACE BIBLIOGRAPHY FOR SECONDARY GRADES. 1961. #NAS 1.19:2. Listings cover books published from January 1958 through June 1961. 30 cents. (S-A)

AERONAUTICS AND SPACE BIBLIOGRAPHY FOR SECONDARY GRADES. Second ed. #NAS 1.9/2: Ae 8/2. Listings cover books published from January 1960 through March 1963. 35 cents. (S-A)

AERONAUTICS AND SPACE BIBLIOGRAPHY. A Bibliography of Adult Aerospace Books and Materials. 1961. #NAS 1.19:3. Listings include books published from January 1958 through June 1961. 30 cents. (A)

AERONAUTICS AND SPACE BIBLIOGRAPHY: ADULT AEROSPACE BOOKS AND MATERIALS. Second ed., 1963. #NAS 1.9/2:Ae 8/3. Listings cover books published from January 1960 through March 1963. 30 cents. (A)

AEROSPACE BIBLIOGRAPHY. Third ed., 1966. #NAS 1.19:35. Listings cover books published from January 1963 through summer 1965, including under one cover for the first time books for the general reader, primary through adult levels. 50 cents. (A)

AEROSPACE MEDICINE AND BIOLOGY: AN ANNOTATED BIBLIOGRAPHY. Arnold J. Jacobius, Roman Kenk and others, compilers. A bibliography of world literature on aviation and space medicine subjects: space biology, ecology, psychology, sensory mechanisms, physiology, psychiatry, stress

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physiology, toxicity, accidents, safety, etc. Includes author, source and subject indexes.

Vols. VII-X, 1958-1961 Literature. 1966. Clearing House.

Pt. 1 #N66-27624 $3. (A)
Pt. 2 #N66-27625 $3. (A)

Vol. XI, 1962-63 Literature. #N65-21424.494 p., 2,335 abstracts. 1965. Clearing House. $3. (A)

(Vols. I and II—*Aviation Medicine: An Annotated Bibliography* and Vols. III-VI—*Aerospace Medicine and Biology: An Annotated Bibliography,* covering literature for the years 1952-57, are also available from The Clearing House at various prices.) (A)

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY. Clearing House. Published at intervals throughout the year. For further information and price, write to The Clearing House. (A)

ANNOTATED BIBLIOGRAPHY OF SPACE SCIENCE AND TECHNOLOGY. Frederick I. Ordway, III, editor. Arfor, 77 p., revised 1962. Paperback, $2.95. A list of the literature of space science and technology, 1931 through 1961, arranged by year. Includes more than 450 titles, a third of them, in the Astronomical Supplement. (S-A)

AVIATION EDUCATION BIBLIOGRAPHY. National Aerospace Education Council, approx. 64 p., 5th ed., 1967. Paperback 50 cents. An annotated, graded list of aviation books, references, periodicals, free and inexpensive teaching aids, films and filmstrips on such subjects as aviation history and biography, types of aircraft, aviation weather, air transportation, learning to fly, military aviation, and the theory of flight. Books include those published in the period 1964 through spring, 1967.

EXTRATERRESTRIAL LIFE: A Bibliography. *Pt. I,* Report Literature 1952-64. 1964. #NAS 1.21:7015. Supt. of Documents. 76 p., 45 cents. Annotated selected references to domestic and foreign reports prepared during period 1962 through July 1964 and stored in NASA information system. (A) *Pt. II,* 1965. #NAS 1.21:7015/pt. 2. 335 p., $2. Annotated published literature, 1900-1964, listing journal articles and books on such subjects as the origin of life on earth, the suitability of environment of other planets for the development of life, the possibilities of intelligent life, and the chemical basis of life. A limited selection of 1965 sources also included. (A)

GUIDE TO SCIENCE READING, A. Hilary J. Deason, compiler and editor. Signet, 288 p., rev., 1966. Paperback, 75 cents. A selected and annotated list of more than 1300 paperbound science books together with a collection of essays by prominent scientists. Books range in difficulty from those that can be understood by students in the upper elementary grades to those which require considerable introductory background in science and mathematics. Numerous astronomy and space science books are included. (U-S-A)

McGRAW-HILL BASIC BIBLIOGRAPHY OF SCIENCE AND TECHNOLOGY. McGraw-Hill, 700 p., 1966. $19.50. 8,000 outstanding recent books in all scientific and technological fields, including space science and technology. Each entry gives title, author, publisher, publication date, a concise description of the book and its level. Includes textbooks, handbooks, manuals, technical titles as well as more general publications. Topical index. (S-A)

SPACE SCIENCE AND TECHNOLOGY. Bernard M. Fry and Foster E. Mohrhardt. Vol. I of *Guides to Information Sources in Science and Technology.* Wiley, 579 p., 1963. $9.50. An annotated bibliography with both subject and authors' indexes. Lists books, reports, papers, conference proceedings, reprints, journals, etc. some of which are of a nontechnical nature. Subjects covered include satellites, environmental and medical factors, Soviet astronautics, space law, space flight, propulsion and propellants, U.S. space programs. (A)

Chronologies

AERONAUTICS AND ASTRONAUTICS. An American Chronology of Science and Technology in the Exploration of Space. 1915-60. Eugene M. Emme. Superintendent of Documents, U.S. Government Printing Office, 240 p., 1961. *Out of print.* A chronological list of achievements in scientific research and engineering development which lie behind the major milestones in man's conquest of the air and space. Appendices include a log of earth satellites and space probes through 1960, and major astronautics awards and honors over the years. (S-A)

AERONAUTICAL AND ASTRONAUTICAL EVENTS OF 1961. Eugene M. Emme. Committee on Science and Astronautics, U.S. House of Representatives, 113 p., 1962. *Out of print.* A sequel to Eugene Emme's chronological list of aerospace achievements from 1915 through 1960—*Aeronautics and Astronautics 1915-60.* An inventory of decisions, announcements, technical progress and flight achievements in 1961. (S-A)

ASTRONAUTICAL AND AERONAUTICAL EVENTS OF 1962. Eugene M. Emme. Superintendent of Docu-

ments, 370 p., 1963. *Out of print.* Report of NASA to the Committee on Science and Astronautics, on the activities, problems, and accomplishments of NASA and its academic, industrial, governmental and international partners in the exploration of space during 1962. Also includes a chronology of major NASA launchings from 1958 through 1962. (S-A)

ASTRONAUTICS AND AERONAUTICS, CHRONOLOGY ON SCIENCE, TECHNOLOGY AND POLICY, Supt. of Documents.

1963. 610 p., #NAS 1.21:4004. $2.
1964. 527 p., #NAS 1.21:4005. $1.75
1965. 681 p., #NAS 1.21:4006. $2.25

Chronologies of events and statements compiled from open public sources for the year indicated. (S-A)

CHRONOLOGY OF MISSILES AND ASTRONAUTIC EVENTS, A. Charles S. Sheldon, II. Superintendent of Documents. 189 p., 1961. *Out of print.* A comprehensive list of significant events in missilery and astronautics from 1686, when Sir Isaac Newton described how an earth satellite is placed in orbit, through Feb., 1961. Includes dates of decisions affecting U.S. space efforts, important launchings, progress reports, predictions for the future, etc. (S-A)

SPACE: FROM SPUTNIK TO GEMINI. Lester A. Sobel, editor. Facts on File, 310 p., 1965. Paperback, $2.95. An indexed chronology of events in space and in world space programs, from the flight of Sputnik 1 in October, 1957 through early 1965. Each event included is described in journalistic fashion. (S-A)

Dictionaries

ABC'S OF ASTRONOMY, THE. Roy A. Gallant, Doubleday, 128 p., illus., 1962. $3.95. An illustrated dictionary explaining more than 500 astronomical terms in simple language. Also includes reference maps, a sky map, and instructions for using a telescope effectively. (S-A)

ACRONYMS AND INITIALISMS. Robert C. Thomas and James Ethridge. Gale, 767 p., 2nd ed., 1965. $15. A guide to 45,000 alphabetic designations, contractions and initialisms, giving translations of many aerospace acronyms such as SST, COIN, TELSTAR, COMSAT, etc. as well as translations of other scientific and technical terms outside of aerospace fields. (S-A)

AEROSPACE AGE DICTIONARY, THE. Clarke Newlon. Watts, 282 p., 1965. $5.95. A comprehensive, quick-reference dictionary of aerospace technical terms that the general reader as well as the specialist can use. Appendices include brief biographies of persons having major roles in our civilian and military space programs, locations and purposes of NASA centers, military units involved in the space program, conversion factors and units of measurements. (S-A)

ASTRONOMY POCKET CRAMMER. Charles M. Huffer. Doubleday, 159 p., illus., 1963. Paperback, $1. A pocket size dictionary of astronomy. (S-A)

AVIATION AND SPACE DICTIONARY. Ernest J. Gentle and Charles E. Chapel, editors. Aero, 445 p., illus., revised 1961. $11. Comprehensive definitions of more than 10,000 aerospace terms. (U-S-A)

CODE NAMES DICTIONARY. Frederick G. Ruffner, Jr., and Robert C. Thomas, editors. Gale, 555 p., 1963. $15. A glossary of more than 8,500 code names, cover words, and nicknames identifying (without technical explanation) aviation, military and scientific space activities, systems, equipment and other terms that have come into use from the year 1910 through Project Apollo. (S-A)

COMPTON'S ILLUSTRATED SCIENCE DICTIONARY. Charles A. Ford, editor. Compton, 632 p., illus., 1963. School and library price, $13.25. Definitions of 3,500 words and terms used in school science courses plus those found in technical articles appearing in non-scientific publications. Covers words and terms from 14 scientific areas including astronautics and astronomy. 1500 illustrations. For each word or term, the pronunciation is given, its meaning is defined, the scientific field to which it belongs is identified, and its use is demonstrated in sentence form. (U-S-A)

DICTIONARY OF ASTRONAUTICS, A. J. L. Nayler. Hart, 316 p., illus., 1964. $6.95. Available also in paper covers, $2.95. More than 2,000 definitions of space terms plus chemical and mathematical tables, formulas, and details on space navigation, planetary conditions, orbits and satellite instrumentation. (S-A)

DICTIONARY OF TECHNICAL TERMS FOR AEROSPACE USE. Supt. of Documents. #NAS 1.21:7, 314 p., 1965. $3. Contains more than 6000 carefully chosen and precisely defined terms. (S-A)

MAN-IN-SPACE DICTIONARY, THE. Martin Caidin. Dutton, 256 p., illus., 1963. $6.95. Definitions and non-technical explanations of 1900 terms dealing with the science and technology of manned space flight. (S-A)

SPACE-AGE ACRONYMS. Reta C. Moser, Plenum, 427 p., 1964. $17.50. More than 10,000 acronyms and 17,000 definitions. The largest compilation of exclusively technical and industrial acronyms available. Cross referenced. (S-A)

SPACE AGE DICTIONARY. Charles McLaughlin, editor. Van Nostrand, 233 p., illus., revised 1963. $7.95. Concise, simple and clear definitions of space age terms relating to rockets, missiles, launch vehicles, satellites and space flight. Includes a chronology of manned space flights and tables of NASA's major launchings. (S-A)

YOUNG PEOPLE'S SCIENCE DICTIONARY. Children's, 240 p., illus., 1964. $6.60. 6500 terms from all physical and biological sciences, with phonetic pronunciation and noun, verb and adjective forms of all vital words. Many space terms included. (I-U)

Encyclopedias

ABOVE AND BEYOND, the Encyclopedia of Aviation and Space Sciences. New Horizons Publishers, 14 volumes plus Teacher's Guide, illus., 1968. $99. A definitive encyclopedia of aviation and space with 3500 entries including definitions and cross references, 4000 illustrations, and index. Written by more than 100 recognized experts in aviation and space flight subjects. Volumes 1, 2 and 3 ready now. Balance of set ready June, 1968. (I-U-S)

ASIMOV'S BIOGRAPHICAL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY. Isaac Asimov. Doubleday, 662 p., illus., 1964. $8.95. Biographies of the world's great scientists and inventors arranged chronologically in order of birth. Covers the entire sweep of history with greatest emphasis on scientists of the 19th and 20th centuries, including the space age. (S-A)

ASTRONOMY A TO Z. Lloyd Motz, editor. Grosset, 331 p., illus., 1964. $4.75. Available also in paper covers, $2.50. An encyclopedia of astronomical information, from "abberation" to "zodiacal light," brought up to date with the findings of space probes and radio telescopes. (S-A)

ENCYCLOPEDIA OF SPACE SCIENCE. Theodore Audel and Company, 4 volumes. 1963. Explanations and illustrations of thousands of space science terms involving astronautics, telemetry, electronics, rocketry, spacecraft, space vehicles, and many other subjects. $19.95. (U-S)

ILLUSTRATED SPACE ENCYCLOPEDIA. Erik Bergaust. Putnam, 188 p., illus., 1965. $3.95. A dictionary/encyclopedia of space terms, including tables and specifications for the various satellites and launch vehicles, a chronology of manned space programs, a condensed log of space projects, a list of space abbreviations, and astronaut biographies and photographs. (U-S)

LAROUSSE ENCYCLOPEDIA OF ASTRONOMY. Lucien Rudaux and G. De Vaucouleurs, editors. Putnam, approx. 400 p., revised 1962. $17.50. A revised edition of the first encyclopedia devoted entirely to astronomy, with more than 800 illustrations. (S-A)

McGRAW-HILL ENCYCLOPEDIA OF SCIENCE AND TECHNOLOGY. McGraw-Hill, 15 volumes, 1966. Numerous articles on space science subjects listed alphabetically, from apogee to weightlessness. School and library price, $235. (S-A)

SCIENCE YEAR—The World Book Science Annual. Field Enterprises Educational Corp. Describes and explains the year's important developments in science and technology. Issued annually. Approx. 440 pp. illus. $5.95 to *World Book* owners; $6.95 to others. Space science selections in 1965 edition discuss such topics as the voyage to Mars, Soviet space science, and the race for space. 1966 edition features articles about landing on the moon, radio astronomy, and Project Apollo. 1967 edition includes articles on the adaptability of man in space, the sun and its effects on manned space flight, new knowledge from a decade of space flight, and the impact of weather satellites on long-range, worldwide weather forecasts. (U-S-A)

Miscellaneous Special References

AEROSPACE FACTS AND FIGURES. 1967 edition. Aero, 140 p., illus., paperback, $3. 1966 edition also $3. A statistical and textual review of the aerospace industry for the year indicated. Covers production, manpower, space programs, research and development, general aviation, air transportation, and military aviation. (S-A)

EARTH PHOTOGRAPHS FROM GEMINI III, IV, and V. Supt. of Documents, #NAS 1.21:129, 266 p., 1966. $7. Reproductions of 244 color photographs of the Earth taken by astronauts during the early flights of the Gemini spacecraft. Shows natural features and some man-made features in 50 countries. Clearly visible details include shorelines, river courses, valleys, geologic fault zones, glaciers, sand dunes, storm cloud formations, highways, canals, areas of recent rainfall and smoke from forest fires and industrial plants. (I-U-S-A)

INTERAVIA ABC, WORLD DIRECTORY OF AVIATION AND ASTRONAUTICS. Interavia, approx. 1400 p., revised and published each March with listings in English, French, German, Spanish and Italian. $16. Listings cover all segments of the aviation and astronautics industries of 185 countries, cross-indexed in 86 separate categories. (S-A)

McGRAW-HILL MODERN MEN OF SCIENCE. McGraw-Hill, 600 p., 1966. $19.50. Facts about 425 outstanding contemporary scientists throughout the world. In addition to biographical information, each article includes a description of what its subject accomplished in science, the problems he faced and how he solved them. Space scientists are included. (S-A)

NASA SPECIAL PUBLICATIONS. #N-67-12720. Clearing House, issued semi-annually. $3. (Free to qualified users through the NASA Scientific and Technical Information Division, Washington, D.C. 20546). A catalog of reports on recent results in space exploration, detailed accounts of significant conferences and symposia, and state-of-the-art reviews in various scientific and technical fields. While most of the publications listed are technical, many may be useful to advanced secondary school students, teachers, and interested adults. The catalog lists handbooks, charts, histories, chronologies, and bibliographies as well as publications of the Technical Utilization series for sale by the Clearing House or by the Supt. of Documents, U.S. Government Printing Office. (S-A)

RANGER IX, PHOTOGRAPHS OF THE MOON. Cameras A, B and P. Supt. of Documents #NAS 1.21: 112. 170 p. of plates, 17 p. of text, 1966. $6.50. The last in a series of five volumes of photographs of the moon taken by Ranger spacecraft, presenting 170 selected Ranger IX frames. (U-S-A)

SPACE SCIENTISTS AND ENGINEERS. Selected Biographical and Bibliographical Listings, 1957-1961. 332 p., 1962. #NAS 1.21:5. Available from Superintendent of Documents, U.S. Government Printing Office. $2. Brief biographies of approximately 1,000 scientific personnel making contributions to the advancement of space science and technology, together with listings of their technical papers and published articles. Subject and author indexes are included. (A)

THE 1967 AEROSPACE YEAR BOOK, 45th edition. James Haggerty, editor, Spartan, 580 p., illus. 1967. $11. An in-depth report of the aerospace industry during the past year. Includes photographs and reviews of major events in research and development, civil aviation, aircraft, missiles, spacecraft, launch vehicles, propulsion systems, and a chronology of highlights of the year, month by month. The 44th ed. (1966) is also available at $10. (U-S-A)

WHO'S WHO IN SPACE 1967-1968. Second edition, 1967. Space Publications. Published annually, $30. A biographical reference book of leaders in legislative and executive federal positions, and in industry management who are involved in the space program. Ready about March 1968. $30. (U-S-A)

WORLD SPACE DIRECTORY Including Oceanology. Donald W. Dean, editor and publisher. American Aviation Publications, approx. 850 p., published each spring and fall. $15. Lists of officers and addresses of U.S. major and component space/oceanology manufacturers; U.S. Government and foreign agencies involved in space/oceanology programs; academic, nonprofit research and professional organizations; and colleges and universities offering courses related to space/oceanology research and manufacturing. (S-A)

YEARBOOK OF ASTRONOMY. Patrick Moore, editor. Norton, issued annually. Star charts, notes on the planets, information on eclipses and other astronomical events of the year are presented for use of the amateur astronomer. Also includes a list of astronomical societies, and a bibliography. Prices vary according to the year. (S-A)

periodicals

part-III

PART III PERIODICALS

AEROSPACE TECHNOLOGY (formerly TECHNOLOGY WEEK). American Aviation Publications, 1001 Vermont Ave., NW, Washington, D.C. 20005. Published bi-weekly, 1 year $6; 2 years $10; 3 years $12. News and technical information about the aerospace technologies. Available only to libraries and to professional personnel engaged in the aerospace industry. (S-A)

ASTRONAUTICS AND AERONAUTICS. American Institute of Aeronautics and Astronautics, 1290 Avenue of the Americas, New York, N.Y. 10019. Published monthly, $12 a year in the U.S.; $13 foreign. Articles on major space missions, spacecraft, launch vehicles, propulsion, problems and possible solutions, and also research and development in aeronautics. While addressed to scientists and engineers of the AIAA, many articles are written in non-technical language. (S-A)

AVIATION WEEK AND SPACE TECHNOLOGY. c/o Circulation Manager, 330 West 42nd St., New York, N.Y. 10036. Published weekly, $10 a year. Single copies, $1. Subscriptions solicited only from management men, engineers, scientists, and military officers having a commercial or professional interest in aviation, including missiles and space technology. Position and company connection must be indicated on subscription orders. Available also to public libraries. Subjects covered: Aeronautical Engineering, Space Technology, Avionics, Air Transport, Management, Finance. (A)

CURRENT SCIENCE. American Education Publications. Education Center, Columbus, Ohio 43216. Published weekly during the school year—32 issues. $1.70 per year. Club rates for 10 or more subscriptions sent to the same address, 85 cents per subscription per year. An 8-page leaflet for junior high school students giving current news about scientific developments. Space flight subjects and space age news are featured regularly. (U-S)

INTERAVIA-Aviation-Astronautics-Electronics. Interavia, 185 Madison Ave., New York, N.Y. 10016. Published monthly in separate English, French, German and Spanish editions with three or four supplements each year. 1 year, $15; 2 years, $25; 3 years, $35. Reports on all sectors of air transportation, the aerospace industries, and the armed forces throughout the world, as well as on important developments and trends. (A)

JETS Journal. Junior Engineering Technical Society, United Engineering Center, 345 East 47th St., New York, N.Y. 10017. Published monthly, September through May, $2.50 for nine issues per year. Single issue, 50¢. The official publication of the Junior Engineering Technical Society, dealing with the various engineering fields including aerospace engineering, astronautics, and aeronautics. (S)

MODEL ROCKET NEWS. Box 227, Penrose, Colo., 81240. Two to six issues a year. A newsletter containing the latest developments in model rocketry, safety tips, and technical information. Free to educators requesting it on school stationery. (U-S-A)

REVIEW OF POPULAR ASTRONOMY. Sky Map Publications, 111 S. Meramec, St. Louis, Mo. 63105. Published six times a year. $4 per year, $7 for 2 years for United States, Canadian and Mexican subscriptions. All other countries, $1 additional per year. Of interest to amateur astronomers. Articles, easy-to-use monthly sky and planet charts, space science information, satellite-finder charts, and telescope making directions. (S-A)

ROCKET-JET FLYING. 50 East 42d St., New York, N.Y. 10017. Published quarterly, $7 per year; $10 per year, foreign. An "ideas" publication devoted to the advancement of rocketry. Includes information on newest developments in rocketry and data useful in calculating the design of reaction engines. (A)

SCIENCE. American Association for the Advancement of Science, 1515 Massachusetts Ave., NW., Washington, D.C. 20005. Published weekly. $8.50 per year. School year subscriptions, $7 for 9 mos., $7.50 for 10 months. Outstanding articles on newsworthy scientific happenings, discussions on vital issues and presentations of scholarly reports and scientific papers. (A)

SCIENCE BOOKS. American Association for the Advancement of Science, 1515 Massachusetts Ave.,

NW, Washington, D.C. 20005. A Quarterly Review published in Sept., Dec., March, and May. $4.50 per year. Single copies, $1.25. Each issue includes critical evaluations by professional scientists, engineers and mathematicians of more than 200 current books on scientific subjects, many of which deal with space science and astronautics for all reading levels. (A)

SCIENCE NEWS. 1719 N St., NW, Washington, D.C. 20036. Published weekly, $6.50 per year. A weekly news magazine of science and technology. Many articles on space research and exploration. (S-A)

SCIENCE WORLD. Science Division, Scholastic Magazine, 50 West 44th St., New York, N.Y. 10036. 28 issues per school year, $1.50; 85 cents per semester for 14 issues. Feature articles, interviews with scientists, science news stories, and project ideas. Space science topics are included and a teacher's edition is provided with classroom subscriptions. (U-S)

SENIOR SCIENCE. Science Division, Scholastic Magazine, 50 West 44th St., New York, N.Y. 10036. 28 issues per school year, $2; semester subscription (14 issues) $1.25. Feature articles, interviews with scientists, project suggestions, science news stories. Useful to the space science class. A teacher's edition is included with classroom subscriptions. (S)

SKY AND TELESCOPE. Sky Publishing Corporation, 49-50-51 Bay State Road, Cambridge, Mass. 02138. Published monthly. $6 per year, United States; $7 per yr., Canadian and South American; $8 per year foreign. Covers wide range of topics of interest to both amateur and professional astronomers. (S-A)

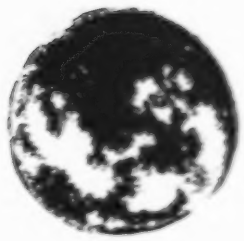
SKYLIGHTS. National Aerospace Education Council, Rm. 616, 806 15th St., NW, Washington, D.C. 20005. Published monthly September through May. $2 for nine issues. A six or eight-page publication including current aviation and space travel news, historical items, unusual aerospace facts and figures, aerospace education news, pictures, etc. Useful in providing background information for junior-senior high school students and for teachers. (U-S-A)

SPACE/AERONAUTICS. Conover-Mast Publications, Inc., 205 E. 42d St., New York, N.Y. 10017. Published monthly, $15 per year in the U.S. and Canada. $20 per year elsewhere. Single copy, $1.25 ($1.70 foreign). Although written for aerospace engineers and scientists, many of the articles are non-technical and would be useful to the general reader searching for information on such topics as new developments in aviation and space technology—aircraft, space vehicles, spacecraft, propulsion, life support equipment, and sub-systems. (S-A)

SPACE WORLD. Palmer Publications, Rt. 2, Box 36, Amherst, Wisconsin 54406. Published monthly, $6 a year; $11 for 2 years. Feature articles and interviews with leading scientists, astronautical engineers, test pilots and planning experts covering manned and unmanned spacecraft, interplanetary flight, space probes and other subjects included in the exploration of space. Soviet space activities are also reported. (S-A)

STUDENT ROCKETEER, THE. Rocket Research Institute, 3262 Castera Ave., Glendale, Calif., 91208. Published quarterly, $1 per year. Designed for student rocket clubs. (S-A)

teaching aids



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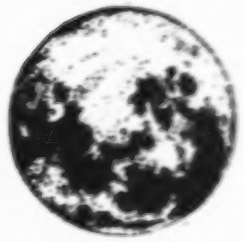

PART IV—TEACHING AIDS

Sources of the selected teaching aids listed below are indicated by the italic code number at the end of each listing. Code numbers together with the corresponding sources and addresses are listed on pp. 57 to 63 of this bibliography. Additional unspecified materials available from aerospace manufacturing companies on various space technology subjects are listed on p. 50-51.

Space Flight

General Information

THE DAWNING SPACE AGE. Includes a history of rocketry, and discusses guided missiles, rocket propulsion, space research, and flight into space. $1.50 (S-A) *27*

AEROSPACE ORIENTATION. A 52-page book introducing aviation and space technologies. Points out the value and effects of aeronautics and space exploration. Describes the nature and uses of airplanes and space vehicles, and explains the industrial, social, economic and political effects of air and space vehicles. $1.25. (A) *27*

OUTER SPACE AND WORLD GLOBE HANDBOOK. Explanations of outer space, man's activties in the space age, the earth's place in the solar system, the measurement of time, the sun and the planets. $1. (I-U) *33*

SPACE TRAVEL. Chart, 54" x 44" in color depicting sequence of events that will lead man into space. Conditions in space. $7.25 (price includes mounting on wood rods with loop for hanging). (U) *39*

SPACE TRAVEL. 1965. (SA 1794) Reprint of the article in THE WORLD BOOK ENCYCLOPEDIA. Describes and updates developments in space travel. Single copy free to teachers. 50 cents to others. *52*

SPACE SONGS. #SO312. A 33-1/3 rpm recording of fourteen space songs covering numerous space subjects such as satellites and rocket ships. $3.95. (P) *104*

SPACE: THE NEW FRONTIER. #EP-6. An illustrated booklet introducing the reader to space exploration and the programs of the National Aeronautics and Space Administration. 96 p., revised 1966. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106*

YOU AND SPACE. An illustrated primary grade supplementary reader to develop concepts of space and space travel. Suggestions for class discussion. 32 p. 50 cents. (P) *107*

THE SPACE FRONTIER WITH ASTRONAUTICS GLOSSARY. An illustrated booklet giving concepts of space and describing problems of space travel. Glossary defines more than 680 space age terms. 32 p. 50 cents. (U-S) *107*

SPACE SCIENCE. Ralph E. Lapp, nuclear physicist, discusses our nation's space program—its goals, methods, and hopes. A glossary of space terms, and a brief list of further suggested reading are included. 60 cents. (S-A) *128*

MASTERS OF SPACE. An illustrated 32-page booklet giving the highlights of the development of rocketry and our space program. 50 cents. (I-U-S) *148*

WAY STATIONS IN SPACE—THE PLANETS. A booklet discussing theories about what we may find when we reach the planets, and descriptions of possible spacecraft that will be used in this venture into space. 25 cents. (U-S) *169*

Manned Space Flight

Astronauts

NASA ASTRONAUTS. #EP-34. 1966. A booklet providing background information about the astronauts together with photographs, biographies and an explanation of training procedures. One copy free. (P-I-U-S-A) *106*

AMERICA'S SPACE PILOTS. Capsule biographies and photographs of the first 23 astronauts selected by the National Aeronautics and Space Administration. Also, brief biographies and photographs of the first Air Force space trainees, articles on space-

flight training, and the prospects for women in our nation's space program. 12 p., 25 cents. (U-S) *107*

Apollo Program

MOON EXPLORATION Part 2: Manned. 20 B/W, 11" x 14" captioned prints illustrating Project Apollo, the Lunar Module, flight paths, and re-entry techniques. $2. (I-U) *30*

TRIP TO THE MOON AND RETURN. Chart, 23" x 29" showing 12 of the major steps in the round trip to the moon. 75 cents. (I-U) *30*

CONGRESS WEIGHS SOUNDNESS OF PRESENT U.S. SPACE POLICY. *Congressional Digest,* Vol. 44, No. 2. Feb., 1965. The pros and cons of Project Apollo as revealed in 1964 Congressional debates about the space program, and in speeches of public officials. Also traces the history of U.S. space policy up to 1958 and the role of Congress in the space program. $1.50. (S-A) *32*

APOLLO SPACE FLIGHT TO THE MOON. Leaflet No. 178, March 1965. A 24-page illustrated booklet covering presentations at the annual meeting of the Division of Engineering Graphics, American Society for Engineering Education, Jan. 1965. Discusses in non-technical language the Saturn-Apollo vehicle, its assembly and checkout operations, and configuration. Describes the launch countdown and lunar mission sequence. Free. (S-A) *54*

TRIP TO THE MOON. #9039. A "Talking Map" with a 33-1/3 rpm record and accompanying coded color chart, approx. 25" x 28", describing the first manned trip to the moon. The various stages of the Project Apollo flight are narrated against a background of sound effects. $1.50 (I-U) *68*

STEPS TO THE MOON KIT. #9030. Chart, 38" x 26" in color illustrates major steps in the Gemini and Apollo projects for eventual manned lunar exploration. $1. (I-U) *68*

MANNED SPACE FLIGHT, APOLLO. #NF-23. A booklet describing the Project Apollo program for placing men on the moon and returning them safely to earth. Shows the Saturn V launching vehicle, the Apollo spacecraft and the Lunar Module designed to land on the moon. 12 p. One copy free. (I-U-S-A) *106* (See NOTE)

PROJECT APOLLO. Chart 44" x 25", with 27 captioned drawings, photographs and diagrams tracing, step by step, how astronauts will land on the moon, what they will do on the moon, and how they will return to earth. $1. (I-U-S) *107*

APOLLO SPACECRAFT MODEL KIT ready to assemble. #H-1836, 1/96th scale with detachable Command and Service Modules, separable Lunar Module and display base. $1.50. (I-U-S) *133*

APOLLO LUNAR SPACECRAFT MODEL KIT ready to assemble. #H-1838, 1/48th scale, 20" high. Includes Command Module with detailed interior, Service Module, adapter section, launch escape system, Lunar Module with removable "ascent" and "descent" sections and foldable legs. Clear plastic windows reveal interiors, and three astronaut figures. Many moving parts, display stand and Project Apollo booklet. $5. (I-U-S) *133*

THE APOLLO PROGRAM. A Midstream Appraisal. 1966. An illustrated booklet containing a lecture in the Edwin A. Link Lecture Series given by George M. Low, NASA Manned Spacecraft Center. The lecturer discusses U.S. efforts to place a man on the moon and the ways of accomplishing the remaining tasks. $1. (S-A) *148*

Project Gemini

GEMINI PICTORIAL. #NF-30. Color photographs of the earth taken from Gemini spacecraft. One copy free. (P-I-U-S-A) *106* (See NOTE)

MANNED SPACE FLIGHT, PROJECTS MERCURY AND GEMINI. #NF-9. Summarizes the successful one-man Mercury and the two-man Gemini flight programs. One sheet folds to 12 p. One copy free. (U-S-A) *106* (See NOTE)

PROJECT GEMINI. #EP-37. An illustrated brochure showing the highlights of the Gemini program, including preparation of the launch vehicle and spacecraft, astronaut training, launch, and recovery operations. One copy free. (I-U-S-A) *106*

NEW SPACE TWINS PLAN HOOKUP AND ORBIT-WALK. *Geographic School Bulletin,* Vol. 44, No. 22, March 7, 1966. 10 cents. (I-U) *111*

SPACE CAMERA REVEALS RARE VIEW OF EARTH. *Geographic School Bulletin,* Vol. 45, No. 6, Oct. 17, 1966. 10 cents. (I-U) *111*

ASTRONAUTS, GEMINI FLIGHT. *Geographic School Bulletin,* Vol. 43, No. 12, Jan. 4, 1965. 10 cents. (I-U) *111*

GEMINI KIT. #H-1835. 1/24th scale, 9" tall. Ready to assemble for mounting on display stand. Has removable equipment section and detachable retrograde package. The hatches open and close. Includes two astronaut figures and instrument panel, plus booklet giving facts about Project Gemini. $3.25. (I-U-S) *133*

GEMINI ASTRONAUT MODEL ready to assemble. #H-1837. 12" high. Includes pressure suit, flexible umbilical, movable face visor, camera and propulsion gun, chest pack, life support package and display base. $2. (I-S-U) *133*

Project Mercury

ASTRONAUT'S VIEW OF THE EARTH. Chart, 23" x 29". Twenty features and places are identified in a photograph of the southwestern part of the U.S. taken from an altitude of 140 miles. 75 cents. (I-U) *30*

MAN IN SPACE. Record, 33-1/3 rpm, 12", 2 sides, #FX6201. Documentary recording of Astronaut Shepard's 1961 Mercury flight, from countdown to evaluation. Includes in-flight conversation between the astronaut and ground control. $5.79. (I-U-S) *55*

ASTRONAUT KIT. #9003. Chart, 38" x 26" in color, illustrating the ascent and return of an orbital flight, the Project Mercury astronauts and spacecraft, recovery procedures and a world map showing the paths of three-orbit spaceflights. $1. (I-U) *68*

FRIENDSHIP 7 WITH ATLAS BOOSTER. #H-1833. Model of Atlas booster rocket with Mercury spacecraft, launching pad, ramp, nitrogen trailer, transporter and operating parts, including an illustrated booklet with technical data and a log of Friendship 7's voyage in space. Ready-to-assemble kit, $2.49. (I-U-S) *133*

SPACE MEDICINE IN PROJECT MERCURY. #NAS 1.21:4003. 198 p., illus., 1965. $1. How NASA's fund of space-medicine information was accumulated and how NASA drew upon the resources of the Air Force, the Navy, other government agencies, industry, and academic and private research institutions to develop life support systems to protect man against the stresses of space travel. (S-A) *156*

Life in Space

LIVING IN SPACE. #NF-27. A description of the ingenious life support systems devised by science and industry to enable spacecraft crews to remain in space for extended periods of time in an earth-like environment. One sheet folds to 12 p. One copy free. For quantity orders see Supt. of Documents listing (#156) p. 63. (U-S-A) *106* See NOTE

SIGNIFICANT ACHEIVEMENTS IN SPACE BIOSCIENCE 1958-1964. #NAS 1.21:92. 128 p., 1966. Concluding chapter on significance is useful. Semi-technical. 55 cents. (A) *156*

Unmanned Spacecraft

Earth Satellites

COMMUNICATIONS SATELLITES

PROJECT TELSTAR. 33-1/3 rpm recording (14 min. playing time) of an "on the scene" conversation between San Diego, California and Andover, Maine, via the communications satellite. $1.50. (I-U-S) *30*

TELSTAR SATELLITE. Two 23" x 29" charts: What Is Telstar? (a detailed illustration of the satellite); and How is Telstar Tracked? (shows satellite and ground station and means of tracking the satellite). Also included is an 11-page booklet describing the satellite, how it works, its telemetry system and ground stations. $1. (U-S) *30*

COMMUNICATIONS SATELLITES. #EP-40. 1966. An illustrated booklet describng the NASA satellites Echo, Relay, and Syncom, and the commercial satellites Telstar and Early Bird. 22 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106*

PROJECT SYNCOM. #NF-18. A description of the development of a communications satellite in synchronous orbit (orbiting in a fixed position above the earth). One sheet folds to 8 pages. One copy free. (U-S-A) *106* (See NOTE)

COMMUNICATIONS IN SPACE. An illustrated booklet giving brief explanations of various kinds of communications satellites—Echo, Syncom, Telstar, Relay, Comsat and others—emphasizing their differences and uses. 50 cents. (U-S-A) *148*

SIGNIFICANT ACHIEVEMENTS IN SPACE COMMUNICATIONS AND NAVIGATION. 1958-1964. #NAS 1.21:93. 68 p., illus., 1966. Information about passive and active communications satellites, and outlook for future use. Semi-technical. 45 cents. (A) *156*

METEOROLOGICAL SATELLITES

METEOROLOGICAL SATELLITES AND SOUNDING ROCKETS. #EP-27. A booklet discussing the development of TIROS and Nimbus spacecraft for orbital flight, and of sounding rockets for observation in the upper atmosphere, to carry on weather observations. 20 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106*

SIGNIFICANT ACHIEVEMENTS IN SATELLITE METEOROLOGY 1958-1964. #NAS 1.21:96. 141 p., 1966. Summary is useful to the non-specialist. Semi-technical. 60 cents. (A) *156*

TIROS. #NAS 1.20:2/12. 1965. Describes the mission of the TIROS satellite which orbits the earth and transmits data to ground stations for use in weather forecasts. 8 p., 15 cents. (U-S-A) *156*

OTHER EARTH SATELLITES

VOICES OF THE SATELLITES. Record, 33-1/3 rpm, 12", 2 sides. #FX6200. Actual recordings of the signals broadcast from orbiting U.S. and Russian spacecraft. Includes the Soviet "astro-dog", Laika's heart-beat, Sputniks 1 and 2, the Doppler effect, Explorers 1 through 4, and Vanguard. Commentary accompanies the sounds. $5.79. (I-U-S) *55*

BIOSATELLITES. #NF-3. Biology experiments in orbiting spacecraft to study the effects of radiation and weightlessness on specimens of plants, seedlings, bread mold, insects, frogs and sea urchin eggs, and other forms of life. One sheet folds to 8 p. One copy free. (U-S-A) *106* (See NOTE)

EXPLORER XXIX (THE GEODETIC EXPLORER). #NF-25. Describes the role of this satellite in discovering more about our planet earth, and the use of satellites in geodesy. One sheet folds to 8 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (S-A) *106* (See NOTE)

ORBITING GEOPHYSICAL LABORATORY. #NF-13. A description of the first of a series of large satellites designed to broaden the knowledge about earth and space, and how the sun affects both. One sheet folds to 8 p. One copy free. (U-S-A) *106* (See NOTE)

ORBITING SOLAR OBSERVATORY. #NF-29. The mission of the OSO—obtaining understanding of the nature of the universe. One sheet folds to 8 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106* (See NOTE)

PEGASUS. #NF-15. Summary of the goals and a description of the satellite sent aloft to collect data on meteoroids and their impact on the spacecraft. One sheet folds to 8 p. One copy free. (U-S-A) *106* (See NOTE)

FIRE 1. The Reentry Heating Spacecraft. #NAS 1.20:2/11. Describes a study of reentry temperatures. 8 p., illus. 15 cents. (U-S-A) *156*

SIGNIFICANT ACHIEVEMENTS IN SATELLITE GEODESY 1958-1964. #NAS 1.21:94. 1966. Discusses discoveries resulting from observations made by NASA spacecraft relating to the size and shape of the earth. Reports on the results of satellite geodesy, the derivation of the earth's gravity field from satellite photographs and by nonoptical tracking, and the determination of relative locations of various areas of the earth. Semi-technical. 70 cents. (A) *156*

Lunar Probes

MOON EXPLORATION. Part 1: Instrumented. 14 B/W 11" x 14" captioned prints depicting the exploration of the moon by Ranger and Surveyor lunar spacecraft. Flight path landing sequence and mission of each spacecraft are described. $2. (I-U) *30*

THE VIEW FROM RANGER. #EP-38. Booklet summarizing the successful Ranger spacecraft program. Emphasizes the Ranger VII operation, the first of the Ranger spacecraft to send close-up pictures of the moon. 58 p. One copy free. For quantity orders see Supt. of Documents listings (#156) on p. 63. (I-U-S-A) *106*

LUNAR ORBITER. #NF-32. Booklet describing the spacecraft that have transmitted spectacular photographs of the moon taken from lunar orbits. One copy free. (I-U-S-A) *106* (See NOTE)

SURVEYOR. #NF-35. Illustrated booklet discussing the spacecraft that makes soft landings on the moon and transmits photographs and data back to earth. One copy free. (I-U-S-A) *106* (See NOTE)

MOON, RANGER 6. *Geographic School Bulletin,* Vol. 42, No. 13, Jan. 13, 1964. 10 cents. (I-U) *111*

MOON, RANGER 7. *Georgraphic School Bulletin,* Vol. 43, No. 1, Oct. 5, 1964. 10 cents. (I-U) 111

PATHFINDING MACHINES SCOUT MOON SURFACE. *Geographic School Bulletin,* Vol. 45, No. 6, Oct. 17, 1966. 10 cents. (I-U) *111*

PROJECT RANGER. #NAS 1.20:3/2. 1965. Describes the spacecraft that telecast to earth photographs of the moon's surface, and also tells about launching and flight to the moon. 1 sheet, folds to 12 p. 15 cents. (U-S-A) *156*

Space Probes

A REPORT FROM MARINER IV. #NF-26. 1966. A final report on the results of the Mariner fly-by of the planet Mars. One sheet folds to 8 p. One

copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106* (See NOTE)

REPORT FROM MARS. #EP-39. An illustrated booklet summarizing the successful Mariner IV mission to the planet Mars. 52 p. One copy free. For quantity orders see Supt. of Documents listing (#156) p. 63. (U-S-A) *106*

PIONEER. #NF-31. Illustrated booklet describing the Pioneer space probes which investigate and monitor interplanetary phenomena at widely separated points in space. One copy free. (S-A) *106* (See NOTE)

MARS, MARINER IV. *Geographic School Bulletin,* Vol. 43, No. 28, May 3, 1965. 10 cents. (I-U) *111*

Rockets And Launch Vehicles

BIRTH OF A MISSILE. 12 B/W 11" x 14" prints with captions. Shows the many steps involved in building a missile—from the first manufacturing processes to launching. $2. (I-U) *30*

MISSILES AND SPACE VEHICLES. 13 B/W 11" x 14" captioned prints presenting the most significant rockets and manned spacecraft. Produced in 1963. $2. (I-U) *30*

HOW BIG ARE MISSILES. 23" x 29" chart comparing sizes of space vehicles, a one-story house and the Statue of Liberty. 75 cents. (I-U) *30*

ROCKETS AND SATELLITES. Chart, 54" x 44" in color. How rockets and satellites get into orbit and what they do. $7.25 (price includes mounting on wood rods with loop for hanging). (U) *39*

ROCKET chart. 33" x 47" in color, mounted on wood rods. #TNP3. Principles of rocket propulsion, Newton's law of motion illustrated. Shows internal components of a rocket, and a launching sequence of a three-stage rocket with satellite aboard. $9.25. (U) *39*

SCIENCE BOOK LAB OF JETS AND ROCKETS. #S1427. Includes a kit for assembling a model jet engine, and a book of experiments to demonstrate the principles of both jet and rocket engines. $2.50. (I-U) *104*

U.S. LAUNCH VEHICLES FOR PEACEFUL EXPLORATION OF SPACE. #NF-20. Discusses the rocket engines and gives scale drawings and vital statistics for the principal NASA launch vehicles. One sheet folds to 8 p. One copy free. (P-I-U-S-A) *106* (See NOTE)

SATURN V. #NF-33. Color wall poster depicting Saturn V, America's largest rocket vehicle which will launch the Apollo spacecraft. One copy free. (P-I-U-S-A) *106* (See NOTE)

ROCKETS AND GUIDED MISSILES. An illustrated booklet giving the history of rocketry, and how a rocket works. 25 cents. (U-S) *169*

Model Rocketry

AN OPEN LETTER TO AMATEUR ROCKETEERS. A leaflet cautioning amateur rocketeers on the hazards of rocket experimentation and firing. Free. (S-A) *10*

CATALOG of model rocket parts and assemblies. 25 cents. (U-S-A) *22*

CATALOG of model rocket kits and assemblies emphasizing expermentation in design, launching and tracking techniques, and instrumentation. Catalog is free. (U-S-A) *23*

EDUCATIONAL PACKET (Ed Pack). A packet explaining model rocketry and its use in motivating upper elmentary and junior high school students to study rocketry and other related scientific subjects. Includes past issues of *Model Rocket News,* technical reports, club guide, catalog, design booklet, safety literature and other pertinent brochures. Packet is free to teachers, youth leaders, and other adults working with young people. Request on school or official stationery and state position. (A) *48*

HIGH PERFORMANCE MODEL ROCKET KITS AND ENGINES. A catalog and price list of solid propellant engines and model kits for the more advanced model roceteer. Free. (S-A) *53*

MODEL ROCKETRY. The Answer to the Youth Rocketry Program. An illustrated leaflet explaining the model rocketry safety program of the National Association of Rocketry. Includes the NAR safety code and a membership application form. Free. (U-S-A) *109*

SECTION ORGANIZATION GUIDE AND APPLICATION. A leaflet explaining how individual members of the National Association of Rocketry can organize an official section of the NAR. Also discusses qualified leadership, advantages of section organization, and insurance coverage, and offers sample by-laws. Free. (U-S-A) *109*

CATALOG of rocket engines, model rocket kits, tracking devices, and test accessories for use by

the model rocketeer. Includes materials for the beginning modeler as well as the more advanced experimenter. Catalog is free. (U-S-A) *134*

BALLISTICS MANUAL. A 38-page handbook containing a brief explanation of external ballistics as applied to fin-stabilized model rockets. Tells how to predict the performance of a rocket before its first flight and how to design a rocket for maximum performance. 75 cents. (U-S-A) *134*

ROCKET SAFETY EDUCATOR. A newsletter for those concerned with rocket safety education. Includes reports on current amateur projects, activities of amateur rocket groups, and safety suggestions. $3 a year for four issues. (S-A) *135*

THE ASTROPHILATELIST. A newsletter reporting on mail-by-rocket activities. $1 a year for two or three issues, including an associate membership in the Rocket Research Institute. (S-A) *135*

THE ROCKET RESEARCH INSTITUTE INC., ITS PROGRAMS AND POLICIES. A description of the purposes and activities of this nonprofit, educational organization. 10 cents. (A) *135*

CATALOG of advanced model rocket systems. Free. (S-A) *136*

Astronomy

Bibliographies

BIBLIOGRAPHY FOR ASTRONOMY AND ASTROPHYSICS. No. 2. A compilation of books, textbooks, atlases, annuals and periodicals to serve as a guide in setting up a library for introductory courses on the secondary school and college levels. Free to teachers and librarians. *2*

ASTRONOMY BOOK LIST. A brief list of recommended astronomy books, atlases, and charts. Includes books on descriptive astronomy, constellations, astronautics, telescope making, photography, the solar system, etc. that may be purchased through the Franklin Institute Science Book Store. The list is free. (S-A) *58*

RECOMMENDED BOOKS ON SPACE SCIENCE AND ASTRONOMY. Four pages listing books on space flight and astronomy subjects selected by the Observatory staff for all reading levels through high school. The entries are graded but without annotations. Free. (P-I-U-S) *147*

Planets and the Moon

THE STORY OF THE PLANETS. A booklet describing the growth of man's knowledge about the planets. 10 cents. (U-S) *2*

SATELLITES OF THE PLANETS. A table of facts about little known planetary satellites. 5 cents. (U-S-A) *2*

PLANETARY DATA. An information sheet giving density, mass, period of rotation, surface temperatures, etc. 5 cents. (U-S-A) *2*

SCALE MODELS OF THE SOLAR SYSTEM. An information sheet listing planets' sizes and distances from the sun. Converts these figures to two scales in which the diameter of the moon is 1/4" and the orbit of Mercury is 1". These conversions result in concepts of size and distance that are familiar to the student. 5 cents. (U-S-A) *2*

LAWS OF MOTION OF PLANETS AND SATELLITES. Chart, 33" x 47" in color, mounted on wood rods. #TNP2. Illustrates laws of celestial mechanics—Kepler's three laws and Newton's law of gravity. $9.25. (U) *39*

OUR MOON. Basic facts and relationships to earth and sun, presented in chart form, 54" x 44" in color, including mounting on wood rods with loop for hanging. $7.25. (U) *39*

SOLAR PLANETARY SYSTEM. Chart, 40" x 28" in color mounted on wood rods. #GS211d. $7. (U) *39*

THE SOLAR SYSTEM. Chart, 54" x 44" in color showing relative size of members of the solar system and their relationship to one another. Table of facts. $7.25 (price includes mounting on wood rods with loop for hanging). (U) *39*

SPACE INFOGRAPH. #9090. Brief facts about the Moon, Mercury, Venus, the Earth and Mars, providing answers to usual questions about these members of the solar system. 50 cents. (I-U) *68*

SPACE KIT. #0161. Includes a 29" x 42" chart in color of the solar system, and illustrates artists' versions of spacecraft of the future. Includes a wheel device giving facts about the planets. $1. (I-U) *68*

STUDENT PROJECT PLANETARIUM. #PR-160-1. Small planetarium model and solar system chart, 22" x 17". May be set to show actual positions of the earth, moon and planets at any given time. Illustrates causes of day and night, seasonal changes, phases of the moon, and planet locations. Study Guide includes planet position tables. $3.95. (U-S) *78*

WHIRLING WORLDS MOBILE AND PLANETS BOOK. #SO524. Colorful plastic mobile ready to

assemble, with instructions. Sourcebook describes the planets, includes information tables, and 40 suggestions for astronomy projects. $2.50. (I) *104*

MOONLIKE MARS SURPRISES SCIENTISTS. *Geographic School Bulletin,* Vol. 44, No. 7, Oct. 25, 1965. 10 cents. (I-U) *111*

MAP OF THE MOON. 35" x 45", B/W, with 600 named lunar features indexed for easy location. Lunar features such as craters, mountains, rills, rays, and seas are readily identified. $1. (P-I-U-S-A) *154*

MARS. #D 301.49/4:MEC-1. A chart with a scale 1:35,000,000 at equator. 22" x 29". 1965. 50 cents. (S-A) *156*

SIGNIFICANT ACHIEVEMENTS IN PLANETARY ATMOSPHERES 1958-1964. #NAS 1.21:98. 1966. Gives highlights and results of space research related to the atmospheres of the earth, Mars, Venus, Jupiter and meteoroids. Semi-technical. 45 cents. (A) *156*

SIGNIFICANT ACHIEVEMENTS IN PLANETOLOGY 1958-1964. #NAS 1.21:99. 1966. Discusses observations made from spacecraft and also earthbound observations resulting in new information about the geology, geography, mineralogy, petrography, seismology and vulcanology of the planets and their satellites, comets and asteroids. Semi-technical. 45 cents. (A) *156*

Stars

WHAT ARE STARS? A booklet telling how astronomers determine what stars are. 20 cents. (U-S) *2*

STARS OF THE WINTER. Simple star maps with brief descriptions. 10 cents. (U-S) *2*

STARS OF SUMMER. Simple star maps with brief descriptions. 10 cents. (U-S) *2*

THE BRIGHTEST STARS AND THEIR COMPANIONS. Information sheets giving brightness, distance, diameter, spectral class, etc. 5 cents. (U-S-A) *2*

MORNING AND EVENING STARS. Dates when the 5 naked eye planets can be seen including "best times" for observation. List revised annually. 5 cents. (U-S-A) *2*

LOOK AT THE STARS. #GC1000. 32-page manual to help teachers and students use a celestial globe. $1.25. (U) *39*

LUMINOUS STAR FINDER. #SF-500. May be set to show positions of stars for any hour and date. Star Map shows constellations, stars to the 5th magnitude, nebulae, and the Milky Way. Instructions and planet position tables printed on the back. 10-3/4" x 11-1/2". $1.50 (U-S) *78*

DESK OUTLINE STAR CHARTS. Designed to teach star and constellation identification. Can be used for student projects or for testing purposes. Project Series (with names) or Test Series (without names) for either northern or southern skies. 11" x 11". *Project Series* #PCN-1-Northern Skies: #PCN-2-Southern Skies. *Test Series* #TCN-3-Northern Skies; #TCN-4-Southern Skies. 50 of one title per package. $1.50 pkg. (U-S) *78*

CONSTELLATION CARD SET. A game for any number of players that teaches the positions of the constellations, major stars and planets. To be played while observing the night sky. $1. (U-S-A) *115*

Telescopes

A SET OF LEAFLETS giving general information about amateur telescope construction: questions and answers, sources of parts, assembly instructions, etc. Free. (U-S-A) *2*

ASTRONOMERS AT WORK. Chart, 54" x 44" in color, depicting astronomical instruments and how they are used; also, radio astronomy. $7.25 (price includes mounting on wood rods with loop for hanging.) (U) *39*

HOW TO USE YOUR TELESCOPE. #9055. Booklet introducing astronomical telescopes and the stars. Covers the selection of a telescope, power, light gathering, field of view, eyepieces, and adjustments. 60 cents. (S) *45*

TELESCOPES YOU CAN BUILD. #9065. How to make 27 different telescopes and 10 useful accessories. 75 cents. (S) *45*

PHOTOGRAPHY WITH YOUR TELESCOPE. #9078. How to take pictures of the moon, planets and stars. 75 cents. (S) *45*

HANDBOOK FOR STAS TELESCOPE KIT. Includes beginning astronomy, basic principles underlying the use of telescopes, suggestions for construction of telescopes, selecting and purchasing them, sky hunting with field glasses, and activities and projects for junior astronomers. $2.50. For the teacher. *152*

Other

EXPLORING THE UNIVERSE. 48-page illustrated booklet discussing the solar system, stars, observatories and planetariums, comets and meteors, arti-

ficial satellites, space observations from balloons, radio astronomy, galaxies, telescopes and the accomplishments of astronomy. 25¢ each for 10 or more. (U-S) *8*

CELESTIAL MECHANICS, A PROGRAMED LEARNING EXERCISE. An 18-page booklet explaining motion in space, gravity, orbits, orbital velocity, escape velocity, and celestial motion. Describes behavior of satellites and space vehicles. Free. (S-A) *27*

SPACE. Chart, 54" x 44" in color showing relationships of various parts of the universe—planets, stars, Milky Way, and galaxies. $7.25 (price includes mounting on wood rods with loop for hanging.) (U) *39*

TIME IN ASTRONOMY. #9054. Booklet explaining solar, sidereal, standard time etc. How to use telescope setting circles and how to adjust an equatorial mount. 75 cents. (S) *45*

GRAPHIC TIME TABLE OF THE HEAVENS. A condensed and simplified almanac in graphic form published annually. Gives rising and setting times of the sun, moon and brighter planets, occurrences of eclipses and other useful astronomical information, including instructions for using the Time Table. While the Time Table is computed for 40° north latitude and 90° west longitude, a correction table for using it at other locations is provided. Large chart, 40" x 27", $1.40 folded or $1.75 rolled. Small chart, 17" x 11", 45 cents. (S-A) *93*

ASTRONOMERS LISTEN TO MUSIC FROM THE STARS. *Geographic School Bulletin,* Vol. 45, No. 1, Sept. 12, 1966. 10 cents. (I-U) *111*

Space Science

NASA'S SPACE SCIENCE AND APPLICATIONS PROGRAM. A Statement Presented to the Committe on Aeronautical and Space Sciences, United States Senate, April 20, 1967, by Homer E. Newell, Associate Administrator for Space Science and Applications, NASA. 182-page illustrated book discussing the impact of space research on science (especially geoscience, physics, astronomy and bioscience); the practical importance of space science; and NASA's space applications programs in geodesy, communications and navigation, meteorology, and earth resources survey. Appendixes include statements about the meaning and importance of our national space program, a comparison of the U.S. and Soviet space science, solar wind, space research and progress in biological science, and numerous other topics of interest to science students. Free. (S-A) *106*

SIGNIFICANT ACHIEVEMENTS IN IONOSPHERES AND RADIO PHYSICS 1958-1964. #NAS 1.21:95. 1966. A summary of newly discoverd phenomena and a discussion of new space techniques for studying the ionospheres. Semi-technical. 45 cents. (A) *156*

SIGNIFICANT ACHIEVEMENTS IN PARTICLES AND FIELDS 1958-1964. #NAS 1.21:97. 1966. New knowledge in the field of geophysics resulting from NASA space research. Discusses the solar wind and its effect on the earth, radiation belts, the earth's magnetic field, cosmic rays and neutrons. Semi-technical. 50 cents. (A) *156*

SIGNIFICANT ACHIEVEMENTS IN SOLAR PHYSICS 1958-1964. #NAS 1.21:100. 1966. Discusses the frontiers of solar research, instrumentation, mapping the sun's ultraviolet and soft x-ray spectra, solar hard x-ray emission, corona, satellite monitoring of solar radiation and the future of solar physics research. Semi-technical. 50 cents. (A) *156*

SIGNIFICANT ACHIEVEMENTS IN SPACE ASTRONOMY 1958-1964. #NAS 1.21:91. 1966. Discusses discoveries stemming from NASA space programs using new tools and techniques in x-ray and gamma ray astronomy, ultraviolet and infrared astronomy, and low frequency radio astronomy, resulting in more accurate knowledge of the universe. Semi-technical. 45 cents. (A) *156*

Effects of The Space Program on Society

APPLICATION OF AEROSPACE TECHNOLOGY AND SYSTEMS TECHNIQUES IN CIVIL AREAS (Selected Examples). Public Relations Release No. 67-22. A three-page description of findings of a survey of 61 aerospace manufacturing companies which shows how these companies are applying their "scientific, technical, and management skills . . . developed and honed in the process of meeting the complex demands of defense and space exploration" in meeting community problems. Subjects discussed in the survey include transportation, urban affairs, medical applications, logistics, information systems, power generation, and oceanology. The release is free. (S-A) *4*

NASA IMPACT ON BREVARD COUNTY. A summary report by A. M. Hartsfield and others. 123 p., 1966. Summary of ten reports relating to government activities and community adjustment in the Cape Kennedy area concerning municipal and county finances, educational system, water and sewer utilites, assimilation of newcomers, community attitudes, etc. A very limited number of copies is available. Single copy free. Request on school or library stationery. (S-A) *80*

SPACE AND THE INTERNATIONAL COOPERATION YEAR—A NATIONAL CHALLENGE. #EP-30. A booklet describing NASA's role in the international, cooperative, peaceful exploration of space. 20 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106*

THE PEACEFUL USES OF SPACE. Public Affairs Pamphlet No. 331. Weather, communications and navigation satellite systems are described. Management problems, international impacts and national policies regarding these satellite systems are discussed. 25 cents. (S-A) *128*

PROCEEDINGS OF THE 5TH NATIONAL CONFERENCE ON THE PEACEFUL USES OF SPACE held in St. Louis, Mo., May 26-28, 1965. #NAS 1.21:82. 199 p., illus., 1966. Discusses space accomplishments to date (1965) and the impacts space exploration will have on education, world peace, science, industry, the economy and communications. $1.50. (S-A) *156*

SPACE EXPLORATION, WHY AND HOW. #NAS 1.19:25. A 20-page booklet explaining some of the benefits and methods of exploring space. 20 cents. (S-A) *156*

RENDEZVOUS FOR . . . SPACE AND THE WEST. #NAS 1.2: R 29. 1965. A 24-page illustrated booklet telling the story of Goddard Launch Operations at Cape Kennedy and the role its people play in preparing rockets and spacecraft for launching—a task that has much in common with our pioneering forefathers' preparations to head West. 20 cents. (S-A) *156*

SPACE TREATY PROPOSALS BY THE UNITED STATES AND U.S.S.R., Staff Report Prepared for the use of the Committe on Aeronautical and Space Sciences, U.S. Senate. #Y 4.Ae8:T 71. 52 p., 1966. 20 cents. (S-A) *156*

SPACE RESEARCH. A booklet describing how space research is changing our lives in the areas of the home, health, education, communications, weather, and the earth itself. 25 cents. (U-S) *169*

Robert Goddard

ROBERT H. GODDARD PORTFOLIO No. 1. Ten selected black and white captioned pictures from the life and work of the "father" of modern rocketry, specially selected by Mrs. Robert Goddard. 8-1/2" x 11". $1 per set. (I-U-S-A) *107*

ROBERT GODDARD: "FATHER" OF MODERN ROCKETRY. Illustrated booklet giving the main facts of Dr. Goddard's life and work. Includes hard-to-find information such as Dr. Goddard's autobiography written in 1927, and a compilation of Goddard exhibits, honors, and memorials. 50 cents. (U-S-A) *107*

SUGGESTIONS FOR COMMEMORATING GODDARD DAY—March 16. A 4-page leaflet calling attention to the significance of March 16 and providing numerous suggestions for individual and class activities for commemorating the anniversary of the first flight of a liquid fuel rocket. One copy free. (A) *107*

GODDARD DAY—By the President of the United States of America, A Proclamation. Two glossy B/W prints covering President Johnson's Goddard Day proclamation dated March 15, 1965. $2.50. (Make check payable to General Services Administration.) (I-U-S-A) *108*

SLIDE—35mm. Replica of Robert H. Goddard's 1926 liquid fuel rocket on display in the NASA museum at Huntsville, Alabama. 35mm slide in color. 35 cents. (I-U-S-A) *159*

Careers

Aerospace Careers—General

SEVEN STEPS TO A CAREER IN SPACE SCIENCE AND TECHNOLOGY. #EP-33. 1966. A booklet that provides high school students with an overview of career choices related to opportunities in space science, engineering, and technology. 24p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (S) *106*

LEARNING ABOUT SPACE CAREERS. #EP-32. 1966. A booklet that provides intermediate and upper elementary grade students with ideas and suggestions for things to do to help with career choices. Includes information about the space industry and the world of work. 24p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U) *106*

SPACE JOBS. #EP-31. 1966. Written for pupils in kindergarten through third grade, this illustrated booklet follows the concept that mysteries of the sky, stars and the moon hold special interest for all children, as do work and play. 16p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (P) *106*

AEROSPACE INDUSTRIES MANUFACTURING WORKERS. #81. Discusses briefly the growth of the aerospace industries and its character today, what kinds of workers are employed, general require-

ments and training, earnings and working conditions and the future of the industry. 40 cents. (S) *142*

EMPLOYMENT OUTLOOK IN AIRCRAFT, MISSILES AND SPACECRAFT MANUFACTURING OCCUPATIONS. #L2.3:1450-93. A leaflet giving a brief description of jobs related to the subject area. 10 cents. (U-S-A) *156*

NASA: TWENTIETH CENTURY EXPLORER . . . into the Sea of Space. U.S. Civil Service Announcement No. 347B, 48p., 1966. An illustrated, comprehensive coverage of career opportunities in aerospace technology announced by the Boards of U.S. Civil Service Examiners for the National Aeronautics and Space Administration. Describes the work of NASA and its facilities. Educational and training requirements, salary schedules for GS grades, and instructions for applying for positions are also given. Free (S-A) *161*

REPRINTS from the Occupational Outlook Quarterly, May 1966. Free. (S) *106* Includes:

DOWN-TO-EARTH FACTS ABOUT AEROSPACE. Discusses the aerospace industry's work force, its products, relationship to the Department of Defense and to NASA, where the industry is concentrated, the ratio of engineers to scientists employed by the industry, "blue collar" job opportunities, administrative and clerical occupations, and employment outlook.

THE MEN BEHIND THE MAN IN THE MOON. Discusses the NASA work force—educational and training backgrounds, geographic distribution, and jobs held by women. Points out how rapid changes in space technology require broad basic training with ability to keep abreast of changes in techniques and knowledge.

NASA COUNSELS THE EARTHBOUND. Describes some of the counseling and educational services offered by the counseling and career guidance program established by NASA. Discusses the NASA Spacemobile program, speaker services, exhibits, educational films, youth activities, and educational assistance available.

The following career materials, while not specifically concerned with aerospace careers, present information that applies to many scientific, engineering and technical occupations in the aerospace industry and in government agencies involved in space research and development projects:

Data Processing Careers

SYSTEMS ANALYST (Data Processing Systems) #98S. A brief description of this occupation. 15 cents. (S) *21*

CAREER BRIEFS. Eight-page booklets discussing the following careers:

Programmer. #144B. 25 cents. (S) *21*
Electronic Computer Operating Personnel. #168B. 25 cents. (S) *21*

EMPLOYMENT OUTLOOK FOR ELECTRONIC COMPUTER OPERATING PERSONNEL, PROGRAMERS. #L2.3:1450-31. 10 cents. (S) *156*

Engineers

YOUR CAREER AS AN AERO/SPACE ENGINEER. Discusses the responsibilities and rewards of a career as an aerospace engineer, the aerospace industry, various jobs within the profession and secondary school and college courses. Also includes a list of engineering schools accredited by the Engineers Council for Professional Development. *Single copy only.* Free. (S) *10*

THE ROAD TO GRADUATE SCHOOL IN ENGINEERING. A booklet discussing the value of graduate work in engineering, graduate degrees, necessary aptitudes, how and where to apply for financial assistance, opportunities for graduate study and other related subjects. 50 cents. (A) *11*

ENGINEER, AEROSPACE #103B. Career Brief discussing history of occupation, duties, working conditions, training requirements and opportunities, qualifications, earnings, advantages and disadvantages, where the jobs are, and employment outlook. 25 cents. (S) *21*

CAREER SUMMARIES. Resumes of duties, working conditions, personal and educational requirements, earnings, and outlook:

Engineer, Ceramic. #22S. 15 cents. (S) *21*
Engineer, Chemical. #136S. 15 cents. (S) *21*
Engineer, Electrical. #112S. 15 cents. (S) *21*
Engineer, Mechanical. #171S. 15 cents. (S) *21*
Engineer, Metallurgical. #334S. 15 cents. (S) *21*

CHEMICAL ENGINEER. #160. A 4-page occupational brief giving a general view of this occupational field. Discusses work performed, working conditions, salaries, personal and educational requirements, and employment outlook. 35 cents. (S) *26*

ELECTRICAL ENGINEER. #158. A 4-page occupational brief discussing the work of an electrical engineer, personal and educational backgrounds required, training opportunities, the place of women in this engineering field, and outlook for this occupation. 35 cents. (S) *26*

ENGINEERING—A CHALLENGE. A booklet describing various engineering fields, including aerospace engineering. Discusses basic preparatory studies, engineering schools, and other career facts. 25 cents. (S) *47*

"SO YOU WANT TO BE AN ENGINEER". A leaflet giving advice to a high school student. Based on a true situation. 5 cents. (S) *47*

AFTER HIGH SCHOOL WHAT? A leaflet to help the high school student decide if he should select a career in engineering or science. 3 cents. (S) *47*

DO I HAVE ENGINEERING APTITUDE? A booklet of questions, answers, and interpretations for use in self analysis. In units of 50 or more only. 50 for $2. (S) *47*

MANUAL FOR ENGINEERING CAREER ADVISERS. An aid to engineers who are involved in career guidance in their local schools. Also of interest to guidance counselors. 25 cents. (A) *47*

CURRICULA LEADING TO FIRST DEGREES IN ENGINEERING. Leaflet listing both schools and types of engineering curricula offered in them. 25 cents. (S) *47*

CONTINUING ENGINEERING STUDIES. Report of the Joint Advisory Committee. . .Meeting the Challenge Through Industry, Academic Institutions, Engineering Societies and Government. $1. (A) *47*

ENGINEERING—A CAREER OF OPPORTUNITY. A leaflet that helps students develop and answer questions about their own interest in and fitness for an engineering career. Free (U-S) *114*

SHOULD YOU BE AN ENGINEER? Leaflet discussing qualifications, specialties, opportunities, income and future outlook. Free. (U-S) *120*

SHOULD YOU BE AN ELECTRONIC ENGINEER? Leaflet discussing qualifications, specialties, opportunities, income and future outlook. Free (U-S) *120*

AEROSPACE ENGINEERS. #201. An occupational brief that discusses the various engineering specialties in the aerospace industry, requirements, how to get started in the profession, and the future outlook for aerospace engineering. 40 cents. (S) *142*

EMPLOYMENT OUTLOOK FOR ENGINEERS: AEROSPACE, AGRICULTURAL, CERAMIC, CHEMICAL, CIVIL, ELECTRICAL, INDUSTRIAL, MECHANICAL, METALLURGICAL, MINiNG. #L2.3: 1450-32, 10 cents. (S) *156*

AN ENGINEERING CAREER FOR YOUR SCHOOL-AGE CHILD. Booklet stressing the need for early preparation and the importance of specialized knowledge and training for opportunities in the age of space travel. 25 cents. (A) *169*

Mathematicians

MATHEMATICIAN. #21B. Career Brief discussing history of occupation, duties, working conditions, training requirements, qualifications, earnings and other features of this profession. 25 cents. (S) *21*

MATHEMATICIAN. #162. A 4-page occupational brief describing the various kinds of jobs open to the mathematician, qualifications, earnings, opportunities for advancement, women as mathematicians, and expectations for future employment in this professional field. 35 cents. (S) *26*

PROFESSIONAL OPPORTUNITIES IN MATHEMATICS. 6th ed. 1964. A 32-page booklet discussing employment of mathematicians in industry, government and in the teaching profession. Describes work, qualifications and training, and where employment may be found. 25 cents. (S) *94*

SHOULD YOU BE A MATHEMATICIAN? Leaflet discussing qualifications, specialities, opportunities, income and future outlook. Free. (U-S) *120*

EMPLOYMENT OUTLOOK IN MATHEMATICS AND RELATED FIELDS: MATHEMATICIANS, STATISTICIANS, ACTUARIES. #L2.3: 1450-47. 10 cents. (S) *156*

Scientists

A CAREER IN ASTRONOMY. A 15-page brochure giving brief information on the nature of the work, the academic training required, and the opportunities available in a professional career in astronomy. Free. (U-S) *7*

EIGHT-PAGE CAREER BRIEFS discussing duties, qualifications, advantages and disadvantages, outlook and other features of these professions:

Physicist. #15B. 25 cents. (S) *21*
Physical Scientists. #171B. 25 cents. (S) *21*

CAREER SUMMARIES discussing briefly:

Biophysicst. #298S. 15 cents. (S) *21*
Astronomer. #99S. 15 cents. (S) *21*

FOUR-PAGE OCCUPATIONAL BRIEFS giving details of the work performed, specialties, working

conditions, personal and training requirements, earnings, training opportunities, entry jobs, and outlook for the future.

Astronomer. #210. 35 cents. (U-S) *26*
Geophysicist. #148. 35 cents. (U-S) *26*
Physicist. #141. 35 cents. (U-S) *26*

LEAFLETS DISCUSSING qualifications, specialties, opportunities, income and future outlook:

SHOULD YOU BE A SCIENTIST? Free. (U-S) *120*
SHOULD YOU BE A NUCLEAR SCIENTIST? Free. (U-S) *120*
SHOULD YOU BE A PHYSICIST? Free. (U-S) *120*
SHOULD YOU BE A SPACE SCIENTIST? Free. (U-S) *120*

EMPLOYMENT OUTLOOK FOR BIOLOGICAL SCIENTISTS. #L2.3: 1450-8. 10 cents. (S) *156*

EMPLOYMENT OUTLOOK FOR EARTH SCIENTISTS: GEOLOGISTS, GEOPHYSICISTS, METEOROLOGISTS, OCEANOGRAPHERS. #L2.3: 1450-29. 10 cents. (S) *156*

EMPLOYMENT OUTLOOK FOR PHYSICAL SCIENTISTS: CHEMISTS, BIOCHEMISTS, PHYSICISTS, ASTRONOMERS. #L2.3: 1450-62. 10 cents. (S) *156*

Technicians

ENGINEERING EDUCATION. The November, 1966 issue of this Journal is devoted to the engineering technician. Discusses the work of the engineering technician, his place on the engineering team, certification, curriculum, the typical engineering technician, academic admission requirements to both accredited and non-accredited schools, and many other subjects of interest to young people seeking information about this career field. $1.25. (S-A) *11*

CAREER SUMMARIES. Resumes of duties, working conditions, personal and educational requirements, earnings, and outlook:

Technician, Electrical Engineering. #224S. 15 cents. (S) 21
Technician, Engineering. #168S. 15 cents. (S) *21*
Technician, Instrumentation. #85S. 15 cents. (S) *21*
Technicians, Research and Development. #316S. 15 cents. (S) *21*
Illustrator, Technical. #260S. 15 cents. (S) *21*

FOUR-PAGE OCCUPATIONAL BRIEFS discussing the work performed, working conditions and earnings, personal requirements, training for the job, opportunities for advancement, and the future of the occupation.

Draftsman, Mechanical. #224. 35 cents. (S) 26
Electronic Technician. #166R. 35 cents. (S) 26
Mathematical Technician. #421. 35 cents. (S) 26

CURRICULA LEADING TO FIRST DEGREES IN ENGINEERING TECHNOLOGY IN THE UNITED STATES. Leaflet listing schools offering technical institute type training, together with curricula. 25 cents. (S) *47*

ENGINEERING TECHNOLOGY CAREERS. A 32-page booklet describing 15 major career fields for prospective students, counselors, guidance directors, etc. Published in 1966, it gives information about the present status and outlook for engineering technology education, describes typical curricula, admission requirements, and job opportunities for graduates in the various technological fields. 50 cents. (S-A) *110*

CAREER MONOGRAPHS describing the occupation, industry, working conditions, requirements, and outlook for the future.

The Aeronautical Engineering Technician. 5 cents. (S) *110*
Drafting Technology. 5 cents. (S) *110*
The Electronic Engineering Technician. 5 cents. (S) *110*
The Electrical Power Technician. 5 cents. (S) *110*

AEROSPACE TECHNICIANS. #381. An occupational brief giving the history of the occupation and detailing the work categories, working conditions, requirements, preparation, earnings and outlook for the future. 40 cents. (S) *142*

EMPLOYMENT OUTLOOK FOR TECHNICAL WRITERS. #L2.3: 1450-84. 5 cents. (S) *156*

EMPLOYMENT OUTLOOK FOR TECHNICIANS: ENGINEERING AND SCIENCE TECHNICIANS, DRAFTSMEN. #L2.3: 1450-85. 10 cents. (S) *156*

Other

THE JETS PROGRAM. A booklet explaining the purposes of JETS (Junior Engineering Technical Society) and how to organize and obtain sponsorship for a student chapter in this non-profit educational organization for stimulating interest in engineering and technical careers. Free. (S) *85*

DIRECTORY OF TECHNICAL INSTITUTE COURSES. A brochure listing technical, engineering, and ap-

plied science schools and their courses which have been approved by the National Council of Technical Schools. Free. (S-A) *110*

ADMISSION REQUIREMENTS FOR APPROVED TECHNICAL INSTITUTE PROGRAMS OF HIGHER EDUCATION. A review of the high school background best suited for success in pursuing a college-level engineering technology program. 5 cents. (S) *110*

CODE OF MINIMUM STANDARDS. A code setting forth the minimum requirements of the National Council of Technical Schools for schools wishing to obtain NCTS official approval; and the programs of instruction they offer. Free. (A) *110*

SUMMER SCIENCE TRAINING PROGRAMS FOR HIGH-ABILITY SECONDARY SCHOOL STUDENTS. Brochure listing institutions conducting programs. List is available in January of each year. Free. (S) *113*

FINANCING A COLLEGE SCIENCE EDUCATION. Discusses several types of financial assistance, how to locate financial aids, federal support for science students, and other sources such as state scholarships, and national scholarship programs. Also lists useful references and guides. Single copy free. (S) *113*

Curriculum Resource Materials And Aids

Film Bibliographies

NASA FILM LIST. A booklet listing selected general interest space films produced by the National Aeronautics and Space Administration. Annotations and instructions for ordering these free loan films are included. One copy free. *40*

FILMS AND FILMSTRIPS FOR THE SPACE AGE. An 8-page listing of sources of films and filmstrips on space research, missiles, space travel, and unmanned satellites. 50 cents. For the teacher. *46*

BETS FILM INDEX. An annotated list of more than 250 free loan films available from industrial and professional sources covering many scientific and engineering fields including astronautics and aerospace engineering. 75 cents. (S-A) *85*

Sources of Aerospace Education Materials

EDUCATIONAL PUBLICATIONS. A booklet listing educational materials published by the National Aeronautics and Space Administration for teachers, students, and the public. Includes booklets and fact sheets on numerous NASA projects such as manned and unmanned spacecraft, launch vehicles, Project Apollo, space careers, astronauts and space science subjects. Also lists curriculum resource aids for teachers and includes order forms and instructions as to how and where NASA educational materials may be obtained. The booklet is free. (U-S-A) *106*

SOURCES OF PICTURES, PAMPHLETS AND PACKETS. 7th ed. 1967. A comprehensive annotated and graded list of selected aerospace education teaching aids—booklets, pamphlets, charts, pictures, leaflets, bibliographies, units, etc. produced by aerospace manufacturers, airlines, government agencies, and private and professional organizations on aviation and space flight subjects. Most of the items are free; none costs more than $10. 50 cents. (A) *107*

BROCHURE describing the aims, objectives, services and publications of the National Aerospace Education Council, a non-profit professional education organization. Free. (A) *107*

SPACE. Price list of space publications available from the Superintendent of Documents, U.S. Government Printing Office. List covers publications on missiles, the moon, NASA, satellites, space education, space exploration, research and technology of interest to the general reader. Ask for latest price list. Free. (U-S-A) *156*

NASA Services

EXHIBITS. NASA educational exhibits range from posters to full-sized models of spacecraft and satellites. Write for further information. *49*

NASA SPACEMOBILE LECTURE-DEMONSTRATION PROGRAM. Provides a systematic means of filling requests from schools for classroom and assembly hall lectures and demonstrations about NASA activities. The Spacemobile is a unit composed of a lecturer with science teaching background, equipment for space science demonstrations, and 20 to 25 models of NASA spacecraft and launch vehicles transported in a panel truck. *106*

SPEAKERS. Speakers from NASA Headquarters and the various NASA field centers are available to student and teacher groups for the purpose of discussing NASA programs. (A) *137*

General Aerospace Education Teaching Aids

HOW TO INTRODUCE THE STUDY OF OUTER SPACE IN GRADES K-6. A leaflet including a sample

lesson on gravity and its effects on orbits of objects in space. Applications for use at each grade level are detailed. Of particular help to the non-science trained elementary teacher. Free. *9*

AEROSPACE EDUCATION. Booklet interpreting aerospace education. Tells why schools are interested, points out the effects of aerospace progress and explains the responsibility for aerospace education, how it may be presented in a school, and its relationship to modern curriculum trends. Free. (A) *27*

AEROSPACE EDUCATION COURSE SYLLABUS. A booklet outlining a two-semester high school course in aerospace education. Suggests topics, materials, number of lessons, class periods, and weeks of instruction. Includes a bibliography. Free. (A) *27*

ASSISTANCE FOR AEROSPACE EDUCATION. Leaflet describing the services and assistance provided by Civil Air Patrol to schools and colleges conducting aerospace education workshops, courses, and in-service training programs. Free. (A) *27*

CURRICULUM OUTLINE, AEROSPACE EDUCATION COURSE-COLLEGE LEVEL. A 12-page booklet containing a detailed outline and guide for conducting a college course in aerospace education. Free. (A) *27*

EDUCATION—AVIATION AND THE SPACE AGE. A handbook for teachers who wish to bring aerospace information into the classroom. Provides an overview of air and space vehicles as well as the uses and effects of aviation and various methods of solving the curricular problems. $1.50. (A) *27*

TEACHING CHILDREN ABOUT SPACE SCIENCE. 78-page illustrated guide presenting a summary of space science and suggested activities for students to demonstrate the principles of space science. The guide was developed to serve as a syllabus for a 13-week TV series on space science. $1.50. (U-S) *30*

EXPLORING SPACE. (SA-2420). A 12-page guide for teachers of grades 4 through 10. Summarizes basic understandings about the universe, space, rockets, satellites, astronaut's equipment, lunar and interplanetary flight. Includes suggestions for study activities such as making a model solar system, writing space guidebooks, tape recording simulated space flights, and exploring the possibility of life on other worlds. Single copy free to teachers. 25 cents to others. *32*

LIFE SCIENCE IN A SPACE AGE SETTING. (EP-43). A guide for teachers at the upper elementary through junior high school levels, prepared at a workshop conducted by the Wayne State University. One copy free. (A) *106*

EARTH AND SPACE GUIDE FOR ELEMENTARY TEACHERS. Based on questions children have asked about the mysteries of earth, moon, sun, stars and space. Suggestions to teachers for developing concepts. 83p. including a bibliography. $1. (A) *107*

AEROSPACE ARITHMETIC. Sample problems showing how children's interest in aviation and space flight may be used to develop arithmetic skills. For grades 1 through 6. 16p. 25 cents. (A) *107*

EARTH AND SPACE SCIENCE—A GUIDE FOR SECONDARY TEACHERS. Out of print. A suggested course of study covering geology, astronomy, weather, and the oceans. Includes space travel. For junior and senior high school grades. 166 p. (A) *107*

A LIST OF SPACE TRAVEL articles appearing in issues of the *National Geographic Magazine* from December, 1926 through Nov. 1966. Free. (I-U-S-A) *111*

SCIENCE ACTIVITIES HANDBOOK. Information about organizing science clubs and setting up club projects. Also gives information about science fairs, the Science Talent Search, science and engineering careers and scholarships. Revised 1966. $1. (U-S) *143*

SCIENCE PROJECTS HANDBOOKS. A student's guide to planning science research projects. 55 cents. (S) *143*

150 SCIENCE EXPERIMENTS STEP-BY-STEP. Instructions and lists of necessary materials for setting up simple science experiments in chemistry, physics, biology and meteorology. Also includes arithmetic and mathematics problems. 65 cents. (U-S) *143*

INTERNATIONAL SCIENCE YOUTH PROGRAM. A leaflet listing science services available to students and teachers through Science Service. Revised annually. Free. *143*

STAS HANDBOOK OF SELECTED EXPERIENCES IN ELEMENTARY AND JUNIOR HIGH SCHOOL SCIENCE. About one-third of this handbook covers rockets and space travel and includes experiments and explanations of the principles of rocket propulsion and spaceflight. $1.95. (U-S) *152*

FROM HERE, WHERE? A space mathematics supplement for secondary levels. 1964. 144p. (NAS 1.2:F 92. $1.25. *156*

INTRODUCING CHILDREN TO SPACE. #NAS 1.19:36. A space handbook for teachers, grades K to 6 (featuring maturity levels 5 through 11 years old). Projects and illustrations described at each age level. 168 p. $1.25. (A) *156*

MODEL SPACECRAFT CONSTRUCTION, UNITS FOR SECONDARY SCHOOL INDUSTRIAL ARTS. #NAS 1.2:SP 1/16. 184-page illustrated guide to building spacecraft models, together with suggested units for classroom instruction in industrial arts. $1. (A) *156*

THE PLANETARIUM. #NAS 1.19:42. A report by the University of Bridgeport on projects for elementary school classes in the Bridgeport Planetarium. 60 p. 40 cents. (A) *156*

THE SHAPES OF TOMORROW. #NAS 1.2:SH2. A supplement in space oriented geometry for secondary levels. Prepared by NASA in cooperation with the U.S. Office of Education. 204 p. $1.50 (A) *156*

SHORT GLOSSARY OF SPACE TERMS 2nd edition. #NAS 1.21:1/2. 51 p., 1966. 25 cents. (U-S-A) *156*

WHAT'S UP THERE, A SOURCE BOOK IN SPACE ORIENTED MATHEMATICS FOR GRADES 5-8. 1964. Student edition, 144 p. #NAS 1.2:W 55/student. $1. Teachers' edition, 144 p. #NAS 1.2:W 55/teacher. $1. *156*

SPACE. A 96-page handbook for the teaching of elementary grade science prepared under the sponsorship of the National Science Teachers Association and NASA. Helps teachers to incorporate space science into the science curriculum. Suggests 80 activities to "create an atmosphere in which children enthusiastically explore, experiment, and speculate about the universe from the vantage point of their space station: the Earth." Material and experiments are arranged from the simple to the more complex. $1.95. (A) *157*

Miscellaneous

EXPLORING NEARBY SPACE. A 48-page illustrated booklet discussing the basic laws of physics and their application to space travel, and such topics as aurora, radiation belts, solar wind, zodiacal lights, plasmas and x-rays. 25 cents each for 10 copies or more. (U-S) 9

LUNAR GARDEN. Chart, 23" x 29" depicting a method of providing food, water and oxygen using the sun's heat, lunar rocks and Chlorella Algae. 75 cents. (I-U-S) *30*

UNDERGROUND LUNAR BASE. Chart, 23" x 29" showing advantages of a permanent underground lunar base giving greater comfort and protection to astronauts. 75 cents. (I-U) *30*

LIFE IN OTHER WORLDS. Chart, 54" x 44" in color shows possible nature of life and conditions in others worlds. $7.25 (price includes mounting on wood rods with loops for hanging). (U) *39*

TERRESTRIAL ATMOSPHERE AND SPACE. Chart, 47" x 66" in color, mounted on wood rods. #TNP1. Illustrates how the ionosphere aids communication. Also displays the electromagnetic spectrum of the sun, cosmic rays, magnetic fields, and orbits of satellites. $19. (U) *39*

COMPUTER MODEL. #70,683. A working model of a digital computer, in kit form ready to assemble. Adds, subtracts, multiplies, memorizes, counts, compares and arranges numbers in sequence. Solves problems, plays games and at the same time instructs in computer fundamentals. Includes a 32-page manual and 15 experiments. $5.98. (An accompanying 50-page programming booklet, #9080, is available for $1.) (S) *45*

LIFTING BODIES. #NF-34. Describes the design, testing and flying of powered and unpowered lifting bodies. Includes a brief technical, illustrated report on types of lifting bodies. One sheet folds to 8 p. One copy free. (S-A) *106* (See NOTE)

THE LASER. #NF-28. An illustrated summary, in general terms, of the laser beam and the role it will play in NASA's exploration of space. Also described are laser applications in medicine, metallurgy, and communications. One sheet folds to 8 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63. (U-S-A) *106* (See NOTE)

HISTORICAL SKETCH OF NASA. #EP-29. A booklet giving a brief account of the establishment of NASA, and of programs carried on during NASA's existence. 56 p. One copy free. For quantity orders see Supt. of Documents listing (#156) on p. 63 (U-S-A) *106*

LIQUID OXYGEN. Data Sheet 283 (revised). A leaflet concerned with safety problems arising from the handling of liquid oxygen. 40 cents. (S-A) *112*

X-15 rocket plane model kit ready to assemble. #H-1164, 9-1/2" long, wingspan 4". Movable verti-

cal fin and dive brakes. Removable rocket engine and canopy section. Two-position landing skids. $1. (I-U-S) *133*

SATELLITE TRACKING PROGRAM HISTORY. An illustrated 6-page review of the history of the Smithsonian Astrophysical Observatory's part in the nation's satellite tracking program. Free. (S-A) *147*

SEARCH FOR EXTRATERRESTRIAL LIFE. (Rep. #365, March 1965). An 8-page leaflet reproducing a script of a radio program discussion by the Science Editor of the *New York Times* and two professors from Yale University's Astronomy Department. The discussion centers on Walter Sullivan's book, WE ARE NOT ALONE. Free. *171*

Aerospace Industries Information Sources

Below are listed the names of aerospace industry companies having free pamphlets, pictures, booklets, charts, or free loan films, etc. for distribution to teachers.

In order to best serve both teachers and companies, the sources are listed under specific subject headings.

Requests for single copies of printed materials should be made on school or library stationery.

When inquiring about the availability of free loan films, ask first for the list of films and loan instructions.

The addresses of the companies appear at the end of this bibliography, on pp. 57-63.

GENERAL INFORMATION ON SPACE

General Electric Co.—printed matter and charts
General Precision, Aerospace Group—printed matter
B. F. Goodrich Co.—free loan films
McDonnell Douglas Corporation—free loan films, charts
Radio Corporation of America—printed matter, pictures

AEROSPACE AND SERVO SYSTEMS

Lear Siegler, Inc.—printed matter

AUXILIARY SPACECRAFT EQUIPMENT

IBM Federal System Division—printed matter
The Marquardt Corporation—printed matter
Radio Corporation of America—printed matter, pictures

BIOASTRONAUTICS

McDonnell Douglas Corporation—free loan films

COMMUNICATIONS SATELLITES

McDonnell Douglas Corporation—free loan films
Radio Corporation of America—printed matter, pictures
TRW Systems—pictures

DATA PROCESSING AND COMPUTERS

General Precision, Aerospace Group—printed matter, pictures, charts
General Precision, Librascope Group—printed matter
IBM Federal System Division—printed matter
Radio Corporation of America—printed matter, pictures

ELECTRIC POWER SYSTEMS

Lear Siegler, Inc.—printed matter

LAUNCH VEHICLES

Ling-Temco-Vought—printed matter
McDonnell Douglas Corporation—printed matter, free loan films

LIFE SUPPORT SYSTEMS

McDonnell Douglas Corporation—free loan films

LUNAR SPACECRAFT

The Marquardt Corporation—printed matter, free loan films
McDonnell Douglas Corporation—free loan films
Radio Corporation of America—printed matter, pictures

METEOROLOGICAL SATELLITES

General Electric Company—printed matter
McDonnell Douglas Corporation—free loan films
Radio Corporation of America—printed matter, pictures

NAVIGATIONAL SATELLITES

McDonnell Douglas Corporation—free loan films
Radio Corporation of America—printed matter

OPTICS TECHNOLOGY

General Precision, Librascope Group—printed matter

PROJECT APOLLO

General Precision, Librascope Group—printed matter
General Precision, Link Group—printed matter
IBM Federal System Division—printed matter

Kollsman Instrument Corp.—printed matter, pictures, free loan films, help with student projects

The Marquardt Corporation—printed matter, free loan films

Radio Corporation of America—printed matter, pictures

PROJECT GEMINI

General Precision, Librascope Group—printed matter

IBM Federal System Division—printed matter

ITT Federal Laboratories—pictures, free loan films

Kollsman Instrument Corp.—printed matter, pictures, help with student projects

PROPULSION FOR SPACECRAFT

The Marquardt Corporation—printed matter

McDonnell Douglas Corporation—free loan films

Radio Corporation of America—printed matter, pictures

Thiokol Chemical Corp.—printed matter, free loan films

TRW Systems—printed matter, pictures

SOLAR CELLS

Radio Corporation of America—printed matter, pictures

SONIC BOOM

The Marquardt Corporation—printed matter

SPACECRAFT GUIDANCE SYSTEMS

General Precision, Aerospace Group—printed matter, pictures, charts

IBM Federal System Division—printed matter

Kollsman Instrument Division—printed matter

McDonnell Douglas Corporation—free loan films

Radio Corporation of America—printed matter, pictures

SPACE MANEUVERING UNITS

Ling-Temco-Vought—printed matter

SPACE PROBES

McDonnell Douglas Corporation—printed matter, free loan films

TRW Systems—printed matter, pictures, free loan films

SPACE SIMULATORS

General Electric Co.—printed matter

General Precision, Link Group—printed matter

Ling-Temco-Vought—printed matter

McDonnell Douglas Corporation—free loan films

SPACE SUITS

The B. F. Goodrich Company—printed matter

SPACE TECHNOLOGY CAREERS

IBM Federal System Division—printed matter

The Marquardt Corporation—printed matter

McDonnell Douglas Corporation—free loan films

Radio Corporation of America—printed matter, pictures

TRW Systems—printed matter, pictures

TELEMETRY

Radio Corporation of America—printed matter, pictures

TRACKING NETWORKS

IBM Federal System Division—printed matter

Radio Corporation of America—printed matter, pictures

VELOCITY PACKAGES

Ling-Temco-Vought—printed matter

V/STOL AIRCRAFT

Ling-Temco-Vought—printed matter

X-15 ROCKET RESEARCH AIRCRAFT

Thiokol Chemical Corporation—free loan films

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